The Journal of Traumatic Surgery and Occupational Diseases

Industrial Medicine

for

Physicians and Surgeons in Industry

Volume 4

Sixty-fourth Annual Meeting

American Public Health Association

MILWAUKEE, WISCONSIN

October 7-10, 1935

INDUSTRIAL HYGIENE SECTION

The Program

Will include papers and reports on:

"Respiratory Disease due to Dust among Anthracite Miners",

"Practical Aspects of Occupational Diseases and their Prevention,"

"Industrial Medical Service in the Telephone Industry",

"Industrial Hygiene Instruction",

"A Program for a National Institute of Occupational Diseases".

Scientific committee reports will include Skin Irritants, Pneumonoconiosis, Ventilation and Atmospheric Pollution, Lead Poisoning, and Standard Practices in the Problem of Compensation of Occupational Diseases.

Benzol Poisoning, Lead Poisoning, Pulmonary Asbestosis and Dust Determinations will also be discussed.

The Speakers

The following well-known names appear on the program:

Dr. J. A. Britton, Supervisor of Medical Service, International Harvester Company,

Mr. J. J. Bloomfield, of the United States Public Health Service,

Dr. C. O. Sappington, Consulting Industrial Hygienist,

Dr. Edward S. McSweeny, Medical Director of the New York Telephone Company,

Dr. Emory W. Sink, Assistant Professor of Hygiene and Public Health at the University of Michigan, and

Dr. Henry H. Kessler, Medical Director of the New Jersey Rehabilitation Commission.

The Audience

Industrial physicians, directors of industrial relations, industrial nurses, industrial hygienists and others concerned with medicine and hygiene in industry.

An Invitation

The readers of this magazine are cordially invited to attend the Milwaukee sessions, the week of October 7, and participate in the discussions.

The Chairman and Secretary of the Industrial Hygiene Section will welcome your inquiries.

HENRY H. KESSLER, M.D., Chairman
Medical Director, N. J. Rehabilitation Commission.

BERNARD S. COLEMAN, Executive Secy.
N. Y. Tuberculosis & Health Assn.,
386 Fourth Avenue, New York City.

AMERICAN PUBLIC HEALTH ASSOCIATION

50 West 50th Street, New York, N. Y.

"Yet when the sickness was sore in in the land,
And neither planets nor herbs assuaged,
They took their lives in their lancet-hand
And, oh, what a wonderful war they waged!
Yes, when the crosses were chalked on the door—
Yes, when the terrible dead-cart rolled,
Excellent courage our fathers bore—
Excellent heart had our fathers of old.

Industrial Medicine

Reg. U. S. Pat. Off.

"If it be certain, as Galen says,
And sage Hippocrates holds as much—
'That those afflicted by doubts and dismays
Are mightily helped by a dead man's touch,'
Then, be good to us, stars above!
Then, be good to us, herbs below!
We are afflicted by what we can prove,
We are distracted by what we know."

—KIPLING.

The Journal of Traumatic Surgery and Occupational Diseases

The Law, the Science and the Economics of Industrial Health

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American Association

—of Industrial Physicians and Surgeons—

TWENTIETH ANNUAL MEETING
Philadelphia, June 10-11, 1935

ALMOST unusual covering of practically all the different important phases of industrial medicine and surgery characterized the program of the 20th Annual Meeting of the American Association of Industrial Physicians and Surgeons.

THE morning session on June 10th included a discussion of dust effects as manifested by x-ray, by Dr. Eugene P. Pendergrass, University of Pennsylvania X-Ray Laboratory, and a description of the bronchoscopic findings in silicosis by Dr. Gabriel Tucker, of the University of Pennsylvania. In this session also there was a Round Table, followed by a general discussion on the various subjects as follows: "Physical examinations," by Dr. G. H. Gehrmann; "Chest and Heart," by Dr. George Morris Piersol; and "Hernia," by Dr. Mervynn R. Taylor.

DURING the afternoon session of June 10th the following subjects and speakers were noted on the program: "The Eyes in Industry," Dr. George H. Cross; "Neuroses," Dr. Clarence Patton; "Dermatoses," Dr. Robert L. Gilman; "Industrial Fatigue Studies," Dr. R. B. Hersey; "Injuries in and around the Knee Joint," Dr. DeForrest Willard; and, to conclude the first day's session, a demonstration by the Department of Hygiene of the apparatus and methods used in industrial hygiene at the Laboratory of Hygiene, University of Pennsylvania, by Dr. Henry Field Smyth and Henry Field Smythe Jr.

THERE was a special evening session on June 10th at the Philadelphia College of Physicians, Industrial Medical Section, Dr. Henry H. Kessler speaking on "The Estimation of the Capacity for Work," and Dr. Henry Field Smyth on "Volatile Solvent Hazards and How to Minimize Them."

THE June 11th sessions began in the morning at the Martin Maloney Clinic of the University of Pensylvania, and was given partly by Dr. Alfred Stengel and staff, and partly by Dr. Charles H. Frazier and his staff. Dr. Stengel gave an informal discussion of the significance of albumin and casts in the urine, and also a consideration of the extracardiac factors in relationship to cardiac symptoms. In the same clinic, Dr. Thomas Fitz Hugh Jr. spoke about the relationship of amidoyprine and agranulocytosis; and Dr. Pepper presented a series of cases of congenital persistent parietal foramina in two different families and a case of possible heat cramps for differential diagnosis. In a seminar by Dr. Charles H. Frazier and staff, Dr. Frazier spoke on "Post Traumatic Sequelae in Head Injuries;" Dr. L. K. Ferguson on "Infections of the Hand"; Dr. J. J. Johnson on "Fractures of the Upper Third of the Humerus"; Dr. V. W. M. Wright on "Physical Therapy for fractures"; Dr. E. L. Eliason on "Function vs. Deformity in Fracture Results"; Dr. Alexander Randall on "Trauma of the Kidney and Bladder"; and Dr. Theodore Orr on "Traumatic Conditions of the Foot."

IN THE afternoon session of June 11th, "The Question of Occupational Disease," was discussed by Dr. R. R. Sayers, of the U. S. Public Health Service, and Dr. C. O. Sappington, of Chicago; Dr. Robert A. Kehoe presented the subject of "The Present Status of Lead"; Dr. Fred L. Hartmann presented and discussed the findings, as well as showed the patient, in a case of manganese poisoning and emphasized the need of careful examination; and Dr. Loyal A. Shoudy discussed informally the "Prevention of Heat Cramps."

THE final session was held at the Annual Dinner at the Hotel Pennsylvania, the speaker being Dr. Stanley P. Riemann, who talked very interestingly and instructively on the subject "Cell Growth and Changes."

X-Rays, Examinations, Hearts, Hernia

DR. EUGENE P. PENDERGRASS, speaking of x-ray findings in silicosis, stated that this is a very intricate problem because of the variations

found in different industries. Dust standards were referred to, especially those worked out by Russell, of the U. S. Public Health Service, the Wisconsin Code, and the work of Cummings at Saranac Lake; and it was stated that these findings are not applicable in all cases, because of different situations in different industries. Among the methods of study is the postmortem, which is not entirely satisfactory; animal experimental methods, which are good; and finally roentgen methods, which are best because they represent "living pathology." Lantern slide chest films were shown, demonstrating the healthy chest taken in a proper position, the differences being apparent because of improper position, and also the differences shown in lateral view. Details of normal structure as revealed by the x-ray film were pointed out. The special technique of rocking the patient while under the fluoroscope and taking a film lying down to demonstrate fluid was also explained. Differences obtained by over or under exposure and over or under development or combinations of these were also detailed. We commonly believe that the right lung contains three lobes and the left two, but accessory lobes have been shown to exist in many instances, and it is not rare to have three lobes on the left and five on the right side. The azygos lobe is another anatomical variation which may occur, and in some instances the apical cap, which may be easily demonstrated in some chest films, may be confused with muscle folds. A scheme of the tracheal lymph node anatomy was demonstrated, and the use of oblique films in bringing out details of these structures. A demonstration adapted from Miller showing blood vessel shadows "end on" was ingeniously described by the use of small cylinders; by shifting the patient it is possible to show that these are blood vessels instead of other shadows. A lantern slide containing the primary lung unit and lymph drainage adapted after Wm. Snow Miller, was also explained. Lantern slides of Gardner's work at Saranac Lake, showing the differences between the behavior of cells in engorging quartz, coal and silicon carbide were commented upon, with a discussion of localization phenomena. The necessity for associating all findings in correlating roentgen changes was also emphasized with respect to a number of cases showing post-operative roentgen changes without corresponding clinical findings, especially with reference to post-operative pneumonia, or what was previously diagnosed as post-operative pneumonitis. The American Public Health Association definition of silicosis was referred to, emphasizing especially the necessity for the occurrence of nodulation, without which a diagnosis cannot be made. The necessity for distinguishing between miliary tuberculosis, mycosis and metastatic carcinoma, in making the diagnosis of silicosis was shown by films. An especially interesting case of multiple cystic degeneration of the lung was also shown.

DR. GABRIEL TUCKER, in discussing the bronchoscopic findings in silicosis, first showed a chest film after lipoidal infection of the bronchial tree. The normal bronchoscopic picture was described, and variations of this noted for diagnosis. The anatomy of the bronchial tree was also described in detail. In silico-tuberculosis, tracheal rings are prominent and the bronchi are somewhat immobile; in early cases there is prominence of the rings without much fixation. Uncontaminated secretion of the bronchial tubes is easily obtainable through bronchoscopic examination, and this may be examined using the regular sputum technique; pieces of tissue are taken for biopsy if there is a thickening on the mucous membrane, but if the membrane is smooth one does not snip off a piece because of the possibility of successive hemorrhage and also because of the possibility of infection after trauma. A very interesting motion picture demonstrating the technique of bronchoscopophy was shown.

DR. EDWARD C. HOLMBLAD, retiring president of the Association, gave the PRESIDENT'S ADDRESS.

The American Association of Industrial Physicians and Surgeons has represented a good open forum, studying the questions of physical examination, hygiene in industry, rehabilitation, administration of medical departments in industry and various other subjects. The lack of uniformity of state laws has been a most unfortunate situation, and the limiting of money for medical care is also deplorable. Many insurance companies go further than the legislative provisions dictate; and both the employer and employee do considerable wrong to conspire against the insurance company which, after all, carries the financial obligation in many instances. The aggravation of pre-existing conditions is a difficult problem in commission hearings, and often awards of permanent and total disability are wrongly made, and consequently have burdened industry. Eventually these losses must be passed on to the consumer. Another perplexing problem in industry is presented in cases of cardiovascular disease. Certain industries have been rather wise in using preemployment examination and placement procedures, although these are usually restricted to long-time employees in contrast to application to fluctuating groups. All of these previously mentioned problems have been a great burden upon industry, although some states have made provisions for caring for such contingencies. Is it not possible that some neutral board could pass upon such disputed cases, and that industry would be responsible only for what is properly assignable to it? Another important trend is the continuous raising of workmen's compensation rates, which is a serious problem in itself.

DR. G. G. GEHRMANN, in opening the Round Table, stated that the company which he represented started examinations of employees in 1911 before the laws included any occupational disease provisions or implications relative to the aggravation of pre-existing conditions. It was discovered that the old cut-and-dried examination was not efficient in the light of modern problems, and it was also realized that conditions in industry are very much different from those in private practice. It appears that the job-seeker is somewhat "on the spot," and history of previous occupations or medical history is not considered reliable in such instances, because of the tendency to evasion. It is, therefore, necessary to use laboratory methods in the checking of physical findings. In the use of the Kahn test on employees, in a series of 2,088 reactions, repre-

senting men from 13 different states, positives were found in 4.8%. A series of x-ray films were shown depicting some of the unusual conditions found, such as unsuspected apical tuberculosis, silicosis, tuberculosis, aortitis, diaphragmatic hernia, calcification of kidney and ureter, tuberculosis with cavitation, carcinoma, hypertrophic lumbar arthritis, and spina bifida. Several problems are important, among them the differentiation of lead poisoning and lues and also the status of diabetes cases. This company x-rays the chests of all new employees and also the backs of all persons over 30 years of age engaged in heavy work.

DR. GEORGE MORRIS PIERSOL, in discussing physical examinations procedures applicable to chest and heart, thought that, although laboratory methods are important, physical examination procedures are still valuable and many times it is only necessary to use such methods to arrive at a diagnosis. Through inspection, which has been very much underrated, much valuable information is obtainable of a confirmatory type relating to asymmetry, differences in expansion, retraction, and lagging. By palpation one expects to obtain valuable information from tactile fremitus. Percussion is helpful in demonstrating any qualities and also in measuring the descent of the diaphragm. In auscultation the normal differences must be noted and the significance of rales quite thoroughly understood. Tuberculosis presents a real problem. Dr. Piersol thought that a large percentage of positive cases could be diagnosed by physical methods; in doing this it is necessary to contrast early changes with advanced changes, and confirm the findings by x-ray. Atelectasis is a very popular diagnosis at the present time, the small type usually being associated with infection; a postoperative pneumonia is many times a real atelectasis. Malignant disease is really increasing and is liable to surprise one in a number of instances; haemoptysis certainly demands investigation regarding the possibility of malignant disease. X-ray and bronchoscopy are useful in distinguishing between concolidation and effusions in questions of malignancy. In heart examinations one should also use inspection for the location and character of the apex beat, the possibility of precordial bulging and other things. The question arises as to whether disturbing factors are inside or outside the general circulation. Palpation may be used as a confirmatory procedure and also to pick up retracted interspaces. Percussion in heart examinations is valuable to demonstrate the width of the arch of the aorta in suspected cases of aortitis. This diseases is especially important in causing sudden death, and luetic coronary disease is also not uncommon. In auscultation, one studies the adventitious sounds. Of the murmurs there are those due to rheumatic, luetic or arteriosclerotic causes. The history is obviously important, as the character and location of the murmur are also of moment. The person with a diastolic murmur is a poor risk because he may go over into subacute bacterial endocarditis, decompensation or coronary occlusion. One can be more lenient in the presence of a mitral systolic murmur. With a rheumatic history or findings, one always has some degree of stenosis with the insufficiency, and it is necessary to investigate thoroughly the etiology of the murmur. Aortic lesions are not by any means all luetic, some are rheumatic. The irregularities and arrhythmias frequently found in young persons are often physiological, but may be due to an irritable nervous system. The commonest types are those mentioned. Extra systoles may be significant and worthy of further investigation. Extrasystoles may mean toxemia, fatigue, actual heart disease or functional disturbance. The electrocardiogram will help in this respect. Auricular fibrillation is usually serious and is a bad risk. Paroxysmal tachycardia must be differentiated and may be serious. Heart block is always suspicious, as it may be real heart block or functional bradycardia. Finally, all arrhythmias should be properly evaluated.

DR. MERVYNN R. TAYLOR, in discussing hernia, stated that this is a time-honored problem. There is a question as to whether industrial hernia ever occurs as the result of a single accident. The legal interpretation is tending generally in this direction. Ordinarily the changes which produce hernia are really slow and are aggravated rather than produced by events. The lower incidence of hernia within recent years has been due to labor saving devices and the selection of better employment risks. When hernia is present at the pre-employment examination, a real problem is presented and there is no definite formula for the solution; it is hazardous to place men with muscular deficiency of the abdominal walls about hernia rings, in heavy work and all such persons should be classified as potential hernias. In an examination of 81 cases ranging in age from 18 to 50 years, 50% showed no real hernia at the initial examination, but definite muscular deficiency about the rings. To establish a real industrial hernia, the onset must be sudden and accompanied by pain; definitely associated with industrial etiology; of recent origin; non-existant before the accident. Hernias have often been observed after appendectomy. More careful examination of men before employment and better placement should help in the solution of the hernia problem.

DR. DONALD LOWE, in the general discussion following the presentation of these three papers, believed that a physical examination should be considered both scientific and sociologic in aspect; it is obvious that one cannot reject all persons found to be defective. In an examination or inspection of over 15,000 employees there was no attempt made to protect insurance plans. In Dr. Lowe's experience, hernias have cost little. Not all heart cases become definite liabilities. We cannot get a superforce and we are not entitled to it. It is believed that most persons can be used properly. When we check disability and death, pension and insurance experience, through all information obtainable, we can develop methods of control. It is best that we consider the type of industry and the kind of management. It is believed that examinations should be made on a sociological basis.

Dr. Wm. A. Sawyer was reminded of Dr. Irving Clark's idea of employing people with defects, but placing them properly. The General Electric attitude at the present time seems to be a higher grade of examinations without too great an elevation of the standards of acceptance. It is be-

lieved that every industry has its own problems, but it is equally obvious that there will be a very hostile reaction to a large group of rejections.

Dr. Loyal A. Shoudy found that different medical directors talked from different points of view relating to various industrial experiences. It is necessary to be fair and protect the men on the job. The location of industries in various states makes difficult conditions, but we should place every man possible, if he is not a hazard to himself, to his fellow employees or to the industry. Many industries would hire men with hernia if the men would be fair. After extensive experience Dr. Shoudy had only seen two cases of actual industrial hernia, one caused by a squeezing type of injury and the other one by a hook injury. Placement is most important, and it is done in Dr. Shoudy's experience, on as extensive a basis as possible. The idea is not to take people out of work wholesale, but to adjust them to conditions.

Dr. Watson asked the question how one would be justified in letting men work in the face of a progressive condition such as silicosis.

Dr. Gehrmann replied that men were not to be rejected promiscuously, but must be placed where there is no risk. Dr. Watson believed that it was especially necessary in chemical industries to use all possible methods in diagnosis and to provide all facilities for such procedures.

Dr. Volney S. Cheney believed that everybody saw the necessity for pre-employment examinations. However, the situation is different in different states, and in some states conditions are such that industry is forced into making rejections under certain circumstances. Dr. Cheney asked Dr. Taylor what he knew about the injection treatment of hernia. Dr. Taylor replied that he had seen one patient who had had the injection method of treatment and later on had found the patient in the Pennsylvania Hospital with an extensive cellulitis, the examination showing a very severe infection.

Dr. Holtz asked if the x-ray chest film was made prior to the examination and if the applicant was told the findings. Dr. Gehrmann replied that the x-ray film was a part of the examination and that the applicant was usually told the findings.

Dr. A. M. Harvey commented that the situation in Illinois was such that labor was against the examination and also against autopsy procedure.

Dr. Lynch asked about the possibility of persons with physical defects having the defects repaired themselves. Dr. Shoudy replied that this has been done in several ways, but there is no regular procedure. Dr. Watson asked Dr. Piersol about the significance of the prolonged expiratory murmur in the examination of the lungs. Dr. Piersol replied that this finding is really significant in most adult chests.

Dr. Holmblad emphasized the necessity of having adequate methods of examination regarding postoperative hernias, with the thought in mind that determination should be made if the man is physically fit for work.

Eyes, Neuroses, Dermatoses, Fatigue, Knees

DR. GEORGE H. CROSS, who spoke on "The Eyes in Industry," opened the afternoon session of June 10th. Industrial ophthalmology has weathered the depression and there has been constant improvement in methods. A thorough examination is a very vital necessity. Unscrupulous firms and individuals have been working on so-called eyesight surveys, which is really a spectacle-selling scheme. The advantages of ophthalmology may be summarized as follows: (1) periodic examination of the eyes; (2) special examinations and fitting of glasses for special types of work; (3) proper selection of goggles; (4) prevention of electric ophthalmia; (5) selection of proper protective devices against infrared and ultra-violet rays; (6) guarding of machines in industry; (7) provision of proper industrial illumination; (8) the elimination of fumes and gases; (9) the training of first-aid personnel; (10) stimulation of safety committees. The speaker was distinctly against the so-called safety "races," which exert a rather improper and insidious influence on employees during safety contests. The use of carbolic acid in denuded areas of the cornea is advised, and a removal of burned edges of the cornea after corneal burns, by burrs, following which a solution of glyceride of tannin is advisable. Dr. Cross has devised and used thin metal conformers which are of considerable help in doing grafts on the eyelids. He advised the substitution of the Dimitry operation for the usual enucleation. In recent years the use of non-magnetic materials has made the removal of such fragments by magnets impossible, and other means have been necessary. Standards for acceptance in industry must vary in different trades. It is known that one-eyed persons can train themselves for accommodation to what was formerly stereo vision. Reference was made to the percentage vision charts put out by the A.M.A. and it was advised that these be used in tests. A series of slides showing fragments of non-magnetic material in the globe of the eye were exhibited, and the method of removal was demonstrated. A fluoroscope is used to determine the position of the fragments, local anesthetic is made use of, and also a retrobulbiar injection of 1% novocaine to prevent rolling of the eyeball. The operative technique was described, and the use of special forceps demonstrated. The Sweet method of localization was also mentioned and demonstrated, as well as the Kelly-Koet method. Illustrations were given of the lodgment of various types of metal particles in the eyeball, including lead, zinc, steel, tin, copper, and brass. Two unusual cases of an entire 22-inch shell in the eyeball were shown.

Dr. Schram, in the discussion, asked if double vision ever occurred in one eye after the loss of the other. The answer was that it had occurred and was not easily explainable.

Dr Holtz asked if a person ever recovered practical stereo vision after the loss of an eye, and the answer was in the affirmative.

Dr. Holmblad asked if there was a great change in the amount of non-magnetic material used. The answer was that cutting tools of non-magnetic material and mixed material are now used a great deal more than formerly. A number of such cases had been seen by the speaker, and extraction of the foreign body done by the technique described, by the use of special forceps. One should also say in this connection that foreign bodies usually work their way to the front and not to the back of the eyeball.

DR. CLARENCE PATTON, in speaking about "Neuroses," stated that the problem of neuroses in industrial medicine is a difficult and extensive subject. In talking about psychoneuroses, we must keep in mind that there is intelligence and emotion to be considered. Intelligence is rated within certain limits. Persons below the 12-year level are defectives. There are two types of psychoneurotics, stable and unstable, this being a question of emotional control. Another type is the psychogenic personality, lacking in control and moral sense, the subclass including addicts, perverts, and "ne'er-do-wells." Still another class is the true psychoses. It is possible to classify neuroses into the principal types: neurasthenia, hysteria, pychasthenia, and the anxiety neuroses. The nerasthenics are constitutionally unfit to carry the load which is put upon them and under protracted rest will definitely recover; such persons should learn to live within their limits. It is here that the emotional and intellectual sides are not even, intelligence being ahead. Thus the magnification of the physical condition becomes an escape. The hysterias are usually physically well, but the emotional state is under par and develops a hysterical reaction. Trauma or interpreted trauma is then a basis for difficulty. The hysteria imitates other conditions, but differs in that it cannot imitate organic trouble. Stress may come from many sources. Anxiety neurosis is similar to hysteria, but may be more concerned with employment; fear is the underlying emotional state. It is necessary to distinguish between psychogenic type of psychoneurosis and the neuroses. In head injuries there is a post-concussion syndrome, composed of headache, dizziness, loss of memory, irritability, difficulty of sleeping and mental depression. This is similar to the neurotic findings but is associated with trauma. Here it is necessary to go deeply into the previous history. Thorough physical examinations are necessary to differentiate the neurological or hysterical states. The handling of the case is very important—all post concussion cases should have spinal puncture for evidence of subarachnoid bleeding. Cases of this type of disturbance should always be with encouraging people and isolated from outside contacts. The treatment of cerebral oedema is free elimination by gastro-intestinal tract, restriction of fluids, the administration of glucose and sedatives. Spinal fluid test can be made after recovery from shock. Early suggestion regarding complete recovery is of great value. All neurotics have a feeling of inferiority, thus seeking an escape through troubles—we should think of these people as needing help to help themselves out of their own situation, which will thus preserve some of their ego. All cases should have a thorough examination and a definite neurological assessment.

DR. ROBERT L. GILMAN, in discussing "Dermatoses," mentioned that in the variation of individual susceptibility, there are two factors concerned, the normal individual and those who are especially sensitive to many of the specific irritants, such as acids, alkalies, formaldehyde, quinine, and others. The mechanism of skin irritation and consequent eruption may be accomplished through breaking of the skin, through general or non-specific lessening of the resistance of the skin, through polyvalency of susceptibility, and through unhygienic practices. The patch test is useful in ruling out various irritants, and in industry a great deal may be accomplished by the substitution of nontoxic substances for those generally used. Substances and conditions which may have an irritating effect upon the skin cover a wide variety, such as heat, cold, x-rays, mechanical irritation, oils, inorganic and organic chemicals, plants, and woods, parasites and bacteria. In the diagnosis of skin conditions, the clinical picture and the industrial environment must be duly considered, taking cognizance of a latent period and also using patch tests. A positive patch test does not always mean a specific reaction. The clinical picture of skin affections includes all types of lesions. Chromic acid and the chromates are usually quite irritant—ordinarily the salts are responsible. It has been found that petrolatum or hyposulphite of soda is a good preventive. Reactions to woods of various sorts appear rather promptly. A great deal of attention has been given recently to erysipeloid in the handling of various animals—a specific serum has been devised. In the prevention of dermatoses, the pre-employment examination, patch tests, hygiene of working conditions (including clothes and person), a minimum use of the irritants which are known, and transference of men to other jobs, are valuable procedures. There is no specific treatment for dermatoses, although bland lotions and stimulating ointments, as well as x-ray exposures, have been found to be of value.

DR. R. B. HERSEY stated that the abolition of long hours has lessened the occurrence of fatigue in industry. In fatigue studies, like the one reported, an analysis of the emotional and production factors were made on various subjects during a year's time; the physiological factors were estimated on a shorter time basis. In these studies of various individuals the emotional control and the blood count showed various relationships. The relationship between emotional states and what is known as the left-hand grasp test were also widely variable due to outside influences. In summary, the study of fatigue means the study of many components. It is hoped that we may be able to know more later about temperament and disposition and the effect of these factors on the production of fatigue.

DR. DE FORREST WILLARD, in presenting the subject of "Injuries in and Around the Knee Joint," stated that he would discuss only common injuries. The history of the injury is very important. In this discussion, sprains and strains, injury to cartilages, and injury to knee pads were covered. Usually the ligaments are involved if there is a lateral strain; the cartilages are usually involved if there is rotation during the injury. The history of locking of the knee makes one suspect an injury to the internal cartilage. Pain may be experienced over all the area of the knee, but it is confined usually to certain local points. Points of tenderness are usually located at the attachments of the ligaments. The x-ray may not be helpful in cases of injury to the knee, except in locking. In regard to treatment, early aspiration may assist or produce infection. A tight dressing will help to bring down the swelling, es-

pecially the Jones dressing which may be used either for ligamentous or cartilagenous injuries. This type of dressing allows the control of pressure, which is a very important point. The dressing may be used for immedate treatment and later treatment, and also for postoperative treatment. There is usually one continuous dressing until the effusion goes down, then an adhesive dressing is put on for seven to 10 days, and a tilting of the shoe outward is done. Usually it is a good idea to use the dressing for at least a minimum of three weeks. In cases of ruptured and dislodged cartilage, replacement should be attempted by manipulation under anesthesia, after which the dressing is worn for a week. If the knee continues to be weak, it is well to bake it and use an elastic dressing with braces for stability, and also massage and, later, active muscular exercise. Persistent locking indicates cartilagenous dislodgment and usually occurs in the anterior portion of the cartilage. In operating, an L-shaped incision is used, running down the border of the patella and to the side. In operations, and in the use of aseptic technique, one must keep away from contact with nosis, simulating conditions of these injuries are the skin as much as possible. In differential diagcysts of the cartilage and contusion of the fat pads. Tears of the crucial ligament offer poor prognosis—in these instances there is an abnormal mobility of the tibia on the joint. In such cases, prolonged support, massage and conservative treatment will sometimes avail. Plastic operations using fascia lata may help, but the result is often a stiff knee. In summary, one must treat early for the best results and overtreat conservatively in the first few weeks.

AS THE final event of the Monday afternoon session there was a demonstration of apparatus and methods used in industrial hygiene, by Dr. Henry Field Smyth and Henry Field Smyth Jr., in the Laboratory of Hygiene.

This included the impinger dust collecting apparatus; carbon monoxide estimation apparatus; apparatus for collecting and measuring benzol, including an interferometer; Pitot tubes; kata thermometer; vane anamometer; sling psychrometer; and a special electrical automatic apparatus for the continuous measurement of concentration of vapors of carbon tetrachloride. There were also photomicrographs of changes in animal tissue from exposure to carbon tetrachloride and some gross specimens of these changes. The animal experiments were also surveyed, these being conducted on different groups of animals exposed to different concentrations of carbon tetrachloride.

Capacity to Work, Volatile Solvents

DR. HENRY H. KESSLER, during the Monday evening session, spoke on value of field studies of health hazards and working conditions by industry, but confined his remarks mainly to various factors in estimating the capacity for work. Dr. Kessler spoke particularly of tuberculosis mortality data in the various counties in New Jersey, and factory experience relating to silicosis and tuberculosis. Reference was made to the story of occupational diseases in its development, especially with regard to radium and benzol experience in the state. In discussing the capacity for work, especial attention was drawn to the thin man and the occurrence of back strain—the large vital capacity and the occurrence of lead poisoning—and the slow reaction time in the occurrence of accidents. Since 13,000,000 persons are gainfully employed in industry, it is estimated that approximately 6,000,000 must pass through physicians' hands, thus establishing the importance of the physician in industry. Custom and legislation have given the physician new power, but not the means for expressing it adequately. Workmen's compensation is really a form of social insurance; there is a really definite struggle between the physician's concept of capacity for work and political ideas. In various experiences, sick benefits have been allotted through various organizations by intuitive correlation and also by scientific methods. General tests of body efficiency and specific tests for extremities and vital organs have been devised. These tests, however, are false because of the selection of a small part of the body by which to measure the efficiency of the body as a whole and also because the mechanics of these tests are fallacious. Errors are frequently due to psychic components and the margin of safety. A serious question for our consideration is: what is illness and who is ill? There are several answers, of course, including the phenomena of suggestion and mental reactions. There is definitely a difference between the state of *being* ill and *feeling* ill. It might be said that illnesses are dynamic while abnormalities are static. There are many examples of the safety factor, and we have had some surprising experiences of persons who were injured seemingly far beyond recovery and apparently permanently and totally disabled, but who have made remarkable recoveries and are still working today. Again, the same disability does not affect two men in the same way. The possibility of adjustments comes largely through the great amount of safety factors provided in the human body. It was the belief of the speaker that personality maladjustments cause greater trouble than physical defects. In closing, Dr. Kessler said that perhaps he had been a little hard on science and scientific methods, but, after all, one must consider other factors outside of such methods, in coming to a reasonable and logical conclusion regarding the causative factors in disability.

DR. HENRY FIELD SMYTH, commenting on "Volatile Solvent Hazards and How to Minimize Them," stated that in industry there are many new forms of solvents with different toxicity and used in unknown quantities. Certain of these are irritant to the lungs and heart. In moderate concentration such vapors may cause changes in the blood or the hemoglobin content. Many are skin irritants and are usually lipoid soluble and therefore, are absorbed by the skin. Liver and kidney effects are common, and the nervous system is also affected. The obese and alcoholics are particularly susceptible. The diet helps resistance, and milk is especially efficacious. Proper handling of the situation necessitates periodic check-up, depending, however, upon the exposure and the type of solvent—the blood and urine should be especially examined. In the prevention of difficulty, enclosed systems are of great value, as well as the periodic estimation of the

concentration of the vapors in the air. The sense of smell is not adequate in detecting the concentration. Short shifts and intermissions of work in the working period are advised. Air-supplied masks also find a place in preventing difficulty. Ventilating systems should have the discharge of contaminated air located outside the area where it may be breathed again. Exhaust systems should be properly controlled, and the local drawing effect is of particular consequence. For heavier than air vapors, a down draft ventilation is necessary. The maintenance of ventilating systems should include regular periodic testing by sampling and analysis of air samples. Gloves and shoes are worn for protective purposes, and should be so fitted as to prevent material collecting inside giving a coated effect or from soaking through. Emollients are sometimes better than gloves. In any industry we should first know the toxicity of new materials or of the materials regularly used —when such toxicity is known, the workers can be protected and conditions of concentration should be checked periodically.

Albumin, Head Injuries, Heat Cramps Amidopyrine, Infections, Fractures

THE Tuesday morning session on June 11th comprised consideration of medical subjects by Dr. Alfred Stengel and staff, and surgical subjects by Dr. Charles H. Frazier and staff.

DR. STENGEL considered first the subject of the significance of albumin and casts in the urine. It was formerly thought that albumin was a serious finding, but later on we found that one had to consider other things and could not rely upon this sign alone in determining the gravity of any given case. As to casts, these occur in showers in diabetes and in febrile conditions and also in a wide variety of other disturbances. In acute glomerular nephritis, albumin and casts may clear up or may persist for a period of time. We must distinguish between the toxic and bacterial types. Red blood cells in the urine with eodema and a rise of blood pressure make the case more serious. A number of case histories were then described.

In Case 1, a girl of 18 had always been well until two months before presenting herself with constipation and fever and the finding of albumin and casts in the urine. After bed rest for a period of six weeks the condition cleared up. Two weeks before entrance to the clinic she had four wisdom teeth extracted, following which there was a follicular tonsillitis with the occurrence of albumin and casts in the urine. After hospitalization the urine showed albumin and casts occasionally but many times nothing. In this instance, there were no red blood cells in the urine and no rise in blood pressure. A difference in susceptibility to different bacterial strains must always be considered. We must also have in mind the possibility of organ deficiency or susceptibility.

In Case 2, there was a prolonged tuberculosis for a period of 15 years, with albumin and casts in the urine but no nephritis.

In Case 3, the patient had been followed over a period of 30 years, having a continuously high blood pressure which was at first 180/120 at the age of 44. This man died at the age of 74 with no evidence of nephritis.

Such experiences demand that we thoughtfully consider that there are many factors in our diagnosis before assuming that albumin and casts in the urine are serious findings.

Dr. Stengel also commented on the subject of extra-cardiac factors in the production of cardiac symptoms. The stomach has a definite effect on heart disturbances. Case 1 was an incidence of Stokes-Adams syndrome. In this instance, there was an abdominal operation, and the pylorus was split to prevent further spasms. After the operation the man recovered completely and had no more heart disturbance. In Case 2 there had been repeated attacks of gall bladder trouble associated with heart disturbance. After thorough examination, however, it was decided to do a prostatectomy, and subsequently the patient improved and did not have further heart difficulty. These cases are but a few of the many which show the necessity for evaluating extracardiac factors in the production of cardiac disturbances.

DR. THOMAS FITZ-HUGH, JR., talked on the subject of relationship of amidopyrine to agranulocytosis. In 1893 amidopyrine was first produced in Germany and in 1897 was patented as pyramidon. In 1922 it was manufactured in this country as amidopyrine. Since then there has been a flood of proprietaries which contain the same drug in varying amounts and which are used very widely both by laymen and physicians. In 1922 Schultz described the agranulocytosis syndrome. Thirty cases of this condition have been seen in this hospital since 1927, and approximately 600 cases have been reported in the literature, so that this condition is not as rare as formerly supposed. One case of especial interest is that of a woman patient with migraine; sustained a fracture of the wrist in an accident and during hospitalization used one of the common proprietaries containing amidopyrine, for pain and nervousness. She left the hospital after several days, but took the drug subsequently for about two weeks. About that time she had a chill with a sore throat, and was hospitalized. The blood picture made the diagnosis. There were ulcers of the pharynx and the alveolar processes, a slight adenitis and a slight jaundice. In such instances the white blood cells may go down to 200 to 300, lymphocytes only being present. Some of these cases arise after tooth extraction, some in the presence of gall bladder trouble and some after influenza, but the drug is usually in the picture. Early in 1934 Madison and Squire reported a series of about 14 cases, and since then many have been reported in the literature. We must say in all fairness, however, that all persons do not react this way to amidopyrine and that really it is a rare idiosyncrasy. However, the mortality is about 80%, so we can probably conclude that the drug is not so valuable that we are warranted in running the risk. After recovery of such cases a test dose may be given which reproduces in miniature the usual symptoms. This confirms, of course, the susceptibility to the drug. Amidopyrine is probably not the sole cause of this condition, but apparently it is the most common external offending factor. Tests have also been made with other drugs, but no differential information has been afforded. In some instances, administration of the barbiturates has approximately the clinical picture, but

some persons may have an unusual idiosyncrasy for the barbiturates. It is believed that the reaction to amidopyrine is an allergic or sensitization phenomenon, but patch tests and scratch tests have so far been negative. Interestingly enough, in one instance a patient recovered entirely while taking amidopyrine after having an attack of agranulocytosis and did not show a positive test in miniature, mentioned above. Other confusing evidence has been presented by testing of persons who are constant users of proprietaries containing amidopyrine and also of two suicides, in finding no change in the blood picture. We must conclude, therefore, that this reaction is a rare and unusual one about which we must gather some further information.

DR. O. P. PEPPER first presented a series of congenital persistent parietal foramina in two different families, one such instance being discovered by accident. Apparently there is no rule or reason, and in this case the discovery was made by putting the hand behind the head of the patient in an attempt to lift him from the bed. Later on this condition was found to exist in skulls in museum collections.

A case of possible heat cramps was also presented for differential diagnosis. In 1904 Edsall pointed out that heat cramps were probably due to the loss of water. Since then we have discovered that the loss of salt is probably responsible for this condition. The differential diagnosis in this patient lies between heat cramps, intestinal obstruction, and nephritis, according to the impressions gained by various members of the staff. The patient has certainly lost chlorides from the blood. In the present findings there is no fever, the pulse is slightly lower than normal, the respiration is normal and the blood pressure varies from 120 to 190 systolic. The history as given by the patient showed that he worked all day in the sun, after which he ate a heavy meal. He then became sick all over his body, breaking out in a sweat, but having no immediate abdominal pain or vomiting. Later on, however, there was severe epigastric pain, and two days after the onset he began vomiting which has continued for several weeks, sometimes as high as eight times daily. With this he became constipated, and the abdominal pain disappeared. The Wassermann has been negative and the spinal puncture negative. He had been a plumber and also worked in a T. N. T. plant. When he was stricken he was painting a boat. On examination, however, there was no lead line and no stippling in the blood. The surgical consultants did not think the abdominal rigidity shown by the patient was significant. An interne thought that gall bladder disease or perforated ulcer might be present. There has been a normal blood count but the chemistry of the blood has been definitely abnormal, there being an increase in urea nitrogen up to 124 — high nitrogen retention — low chlorides (532 mg.)—and carbon dioxide 49% by volume. The urine has shown consistently a low specific gravity, never being over 1.010. The functional test for the kidney showed 7% in 24 hours, this being total. The urea clearance was 4% normal. We must also think of a possible intracranial disturbance here on account of the rising blood pressure, the vomiting, the slow pulse, and the apparent mental hebetude. Another condition which we must consider is the occurrence of koilonychia with gastric anacidity. The case presents an unusual one for differential diagnosis.

DR. CHARLES H. FRAZIER, in discussing surgical subjects, considered post-traumatic sequelae in head injuries, naming concussion, oedema, punctate hemorrhages, laceration of the brain tissue, particularly at the base of the frontal lobe, and the occurrence of areas of softening and cortical scars, as conditions more generally found. Symptoms include headache, dizziness, lack of concentration, bad memory, and later epilepsy as some of the late effects of head injuries. It may be advisable to do spinal puncture on all head injuries. In fractures there is less liable to be brain injury because of the distribution of the force. The neurological examination is fairly easy and should include an examination of cranial nerves. Vestibular tests should be done and encephalograms used in the diagnosis. Within recent years neurologists have more easily been able to demonstrate an organic basis for symptoms and difficulties. One of the important principles of treatment is to keep the intracranial pressure down—in this regard limitation of fluids is important and the patient may need to rest for a continuous period of six months. We consider epilepsy surgical if there are focal lesions demonstrated and particularly if we find a cortical scar present.

DR. L. K. FERGUSON mentioned five important lesions of infections of the hand. The first is lymphangitis which is more serious on the thumb side; second, infection of the fingertips in the so-called "closed spaces," where the fascial structure is bound down — this produces rapid swelling and the cutting off of the blood which results in acute symptoms and involves the phalanx, necessitating early incision and drainage; third, the so-called "collar button" abscess which is really an infection of a callous or blister and is often confused with tenosynovitis—also necessitating incision and drainage on the palmar surface; fourth, tenosynovitis, particularly occurring from injury along the finger and in which one frequently sees a swelling of the entire finger necessitating early incision and drainage; and finally, infection of the palmar spaces either the so-called middle, or the thenar space—this may occur as the result of direct or external infection, necessitating incision and drainage of the spaces with care being taken not to force the spaces open too far. In summary, operation should be done early within the first 24 hours under general anesthesia with a bloodless field and with adequate light (the bloodless field being accomplished by use of tourniquets); there should be no dependence on antiseptics—there should be adequate drainage—use of vaseline gauze dressing and wet dressing.

DR. J. J. JOHNSON, in commenting upon fractures of the upper third of the humerus, stated that these occur usually in persons over 45 years of age. In a series of 49 cases, the number of reductions was noted: there being no reduction in 11 cases, one reduction in 28, two reductions in six, and three reductions in two cases; traction was done in two cases and operation in five. As to the dressings used, five were operative dressings—15 abduction casts—19 axillary pads—two trac-

tion—four Velpeau—and four had none. In a series of 54 cases, and following up for results, 46 had good functional results — six had moderate limitation—one had only 50% mobility—and another case was one of extreme limitation. A case was demonstrated by x-ray showing obtaining of good function with simple traction after considerable deformity.

DR. V. W. M. WRIGHT, in commenting upon physical therapy for fractures, stated that the industrial physician was interested in functional and economic results. Early return of function is much more easily accomplished with an open cast, the principle being availability for early physical therapy. The split cast is also valuable, permitting access from the side and application of heat. Concerning methods of practical physical therapeutic value which are always available, simple demonstrations were given as follows: crushing of a newspaper with the fingers of one hand—carrying a soft rubber ball in the pocket and squeezing and handling it periodically —dropping a sponge in hot water and squeezing it out, watching the bubbles—water pistols for children for squeezing purposes—rotating of the wrist by wooden or metal rod in the hand—rotating of pail of water increasing the amount each day—swinging exercises from the shoulders for getting the humerus into motion. It is through these simple exercises, available to all patients, that one can obtain continuous therapy without expensive apparatus and without time-consuming supervision.

DR. E. L. ELIASON, in presenting the subject "Function vs. Deformity in Fracture Results," believed that many times the physician treats the film and not the patient—that there is too much concentration on trying to get a cabinetmaker's result. Physicians make use of open reduction today much less than 10 years ago. The functional result is the real objective rather than the cosmetic effect. An important consideration is the subject of epiphyseal separation shown by the figures in 293 cases of juxta-articular injury, in which 114, or 38.9% were epiphyseal separations. Ninety-three percent of the separations occurred at the lower portion of the radius or humerus. In such separations a perfect reduction does not bring about a perfect result, such result often appearing after an imperfect reduction. Nonunion or necrosis is most infrequent. The blood supply is mainly through the periosteum. The conjugal cartilage represents a vascular barrier. Repeated attempts at reduction are not considered good therapy in some instances. Once in a while reduction may cause a defect. Separations are different from fractures in that there is not much pain or scattering of fragments or disability. An x-ray demonstration of such cases was given.

DR. ALEXANDER RANDALL considered different types of trauma of the kidneys and bladder, mentioning perirenal extravasation—those involving the pelvis and producing haematuria—injuries to the ureter and complete severance of the ureter. The majority of these injuries do not bleed intraperitoneally. Operation has been over-emphasized. Usually after 48 hours the main difficulties encountered are extravasation of urine and infection. Usually haematuria is not serious, and operation is more favorable 48 hours subsequent to injury. Case reports of multilocular cysts and tuberculosis in traumatic cases were given. Intravenous urography is a great help in diagnosing and can be done periodically in extensive injury. In trauma of the bladder an injury occurs because of distention of the bladder; a prompt diagnosis is necessary, there should be no instrumentation, urography should be used and one should catharize and aerate the bladder, using the stethoscope for hearing air leaks, and using the fluoroscopic screen to help in the diagnosis. In such injuries immediate surgery is necessary, with possible drainage and always an inspection of the peritoneum.

DR. THEODORE ORR spoke briefly on traumatic conditions of the foot, considering the anatomy and the functional arrangement. Swelling and fractures were discussed, and methods of treatment outlined. Especial emphasis was placed on the knowledge of the bony structure of the foot and pathology as effective in the diagnosis of traumatic conditions of the foot.

Occupational Diseases, Lead, Manganese

TUESDAY afternoon, June 11th, was devoted to the consideration of subjects relating to occupational disease. "The Question of Occupational Disease" was discussed by Dr. R. R. Sayers, of the U. S. Public Health Service, and "The Significance of Occupational Diseases" was given consideration by Dr. C. O. Sappington.

DR. SAYERS thought that the matter of the definition of an occupational disease is of great significance, and discussed various definitions without citing any one as being adequate. The schedule of diseases approved by the International Labor Office as being compensable was referred to as being significant. Reference was also made to the usual procedure of commission hearings and the difficulty of getting adequate information. The question of tuberculosis is quite complicated—nurses have been given compensation, and rightly so, for tuberculosis. We need, particularly, statistics on the occurrence of tuberculosis in industrial groups, and especially as related to occupation. A medical board should be appointed in conjunction with the administration of compensation laws, if we are to get good results. We ultimately come to the conclusion in our industrial work that the job of the industrial physician is to protect the working population. The value of standards and codes was discussed. It must be acknowledged that the medical profession is definitely concerned with accidents where the human factor is a part of the picture—and this probably includes all accidents. One of our great difficulties at the present time is that there is no statistical information on the occurrence of occupational diseases in various industries.

DR. SAPPINGTON thought that industrial medicine at the present time very much needs a modern Osler. The reasons for the occurrence of occupational disease were discussed, and methods for the recognition of occupational hazards and disease outlined. The subject of the necessity for distinguishing between occupational and non-occupational disease is a very important one. The socio-economic effects of occupational diseases

were particularly stressed, these including effects upon employees, employers and insurance companies, the cost, and the legislative trends. It was believed that the control or prevention of occupational disease is the most important part of the whole problem and the most economical procedure, viewed from any angle. Finally, the development of adequate professional personnel which can properly integrate information regarding industrial exposure with medical data is considered to be a most serious problem and one which involves a program which must extend through many years.

DR. ROBERT A. KEHOE presented, on lantern slides, a series of very interesting statistics regarding the subject of the present status of lead. It is a normal finding to discover lead in the tissues and exreta. We must also recognize that there are appreciable amounts of lead found in common foods. It is believed that the amount of lead in feces is a fair estimate of the amount of lead found in the exposure. The urinary excretion of lead may be regarded as a measure of the extent of absorption. However, in many instances the excretion does not parallel the absorption. Data were presented on the distribution of lead in the tissues in a fatal case.

DR. HOLMBLAD, asked if there was a difference in the amount of lead respired or ingested; the answer to this was that there was an elevation in the urinary and fecal excretion due to respired lead.

DR. WATSON asked about the status of de-leading; the answer to this was that there was not time to make an interpretive statement, but briefly de-leading as a diagnostic measure is a fallacy. It is believed that in most instances the individual would de-lead himself gradually and effectively if removed from the exposure. The question was asked as to the value of the microscopic examination of blood in the diagnosis of lead poisoning; the answer was that stippled cells are really not diagnostic in themselves but are diagnostic from the standpoint of quantity. There is apparently no relationship between the amount of stippling and the degree of exposure, but the longer the exposure, the greater the tendency to a larger number of stippled cells. What is significant is the increase in the number of stippled cells and the persistency of this increase. The hemoglobin and the red blood cells are not affected unless there is an intoxication.

DR. FRED L. HARTMAN presented a case report and a patient affected by a manganese poisoning. The patient entered the hospital February 4, 1931, at the age of 46, and had been previously engaged in the grinding of manganese. There was a negative history medically, and no evidence of alcoholism or venereal disease in the history. His complaint was of unusual drowsiness coming on at any time, cramps in the legs, difficulty in speaking and moving, dull headache, no ambition. He fell down, two weeks before admission, in merely attempting to walk naturally. His appetite was good but he had always been constipated. The physical examination showed a typical Parkinsonian appearance, with mask-like facies. Laboratory findings were negative, and it was noted that the patient had a deep sigh. The visual fields were normal. The voice was husky, low and monotonous; tongue showed a coarse tremor. There were no sensory disorders, and the coordination of muscles was good. Diagnosis lay between encephalitis and manganese poisoning, but since the man was working in manganese, the diagnosis was made on the typical findings as noted and the exposure. The gait was altered and there was an intentional tremor of the hands. In reviewing the cases in the literature there is no record of a fatality, although these patients were very sick and continued to be up to the time of demise from some other cause. The pathology as worked out shows destruction of certain areas of the central nervous system being responsible for the symptoms. A point to be remembered is that workmen swallowing continuously large amounts of manganese dust may supply dissolved manganese dust to the internal organs, and the factor of a high acidity may thus be involved. The patient was demonstrated with regard to gait, inability to control facial expression and slow speech.

DR. LOYAL A. SHOUDY discussed the clinical picture of heat cramps as seen in the foundry. For many years he has had some interesting observations. Among them is that men who ate peanuts for years showed no disability due to heat cramps. Another group he found ate peppermints and had no difficulty. Another group ate pretzels and drank beer and had no difficulty; and still another used oatmeal water. It seemed those who ate peanuts and pretzels obtained an added amount of salt, those who ate peppermints obtained glucose, and those who drank oatmeal water increased the intake of potassium salts. Subsequently salt tablets were used in the steel industry, but it was found that one man had difficulty with urinating, and so they cut down the salt intake and advised the use of 2-gr. tablets instead of those larger. Although this method of prevention worked, Dr. Shoudy was not satisfied. In one instance where a man was entirely unconscious and showed heat effects, he was given a dextrose injection and completely recovered in a short time. In another instance, where a man was in a bad condition, an intravenous injection of glucose was given with equal salutary effect. At the present time this steel group is using a tablet composed of 5 gr. of sodium chloride and 5 gr. of dextrose and this is giving very good results, this procedure having been in effect for the past five years.

The Significance of Occupational Diseases

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THE biological, chemical, physical, and socio-economic phenomena of occupational diseases have never yet been critically analyzed nor carefully integrated on any extensive basis. If this statement seems to be a mere collection of words, even superficial consideration of it will reveal its hidden and startling implications. If any branch of medicine ever needed a modern Osler, it is industrial medicine today.

It is not the purpose of this brief presentation to solve the perplexing problems of occupational diseases, but rather to indicate where the diffi-

culties lie. In doing this, we must consider briefly certain cause and effect relationships, and mention things that may even seem obvious. This may be accomplished rather rapidly by answering a series of questions:

WHY does occupational disease occur? Although there may be many differential reasons and particular factors in the occurrence of occupational diseases, some of the principal ones may be briefly cited as follows:

1. Selection of poor risks. This has reference to a lack of appreciation of the possible aggravation of defects or actual production of disease by occupational exposure, in the bodies of those who have such defects or abnormal conditions.

2. The breaking down of normal physiological defenses. A great amount of reserve is provided in the human body, and it is only when this reserve has been severely taxed that the defenses which normally operate are broken down, and disease occurs.

3. Predisposing factors in different individuals. In addition to personal susceptibility or idiosyncrasy, which it is difficult to measure or express, there are the elements of race, age, and sex, which may play determining roles in the occurrence of occupational disease.

4. The exceeding of the threshold or toxic limits of injurious substances. We know in a great many instances the average amount of an injurious substance which will produce poisoning or disease, through exposure in the industrial environment. When such limits are exceeded, the ultimate result is the occurrence of poisoning or occupational disease.

5. A change of processes and materials. The difference between a cold and a hot process may be the difference between no hazard and an actual and serious occupational disease hazard. It is also important to know, when changing from one industrial compound to another, what its possibilities are of producing an occupational disease, in addition to knowing the manipulations during a manufacturing process.

6. The lack or inefficiency of environmental protection. This has reference to apparatus which is used to clear the air, such as exhaust ventilation systems, or respiratory protective devices which are worn by individual employees; the case is obvious where there is a hazard and no protective appliances are provided—what has not been seriously considered is the necessity for the continued maintenance and upkeep of such equipment so that it may function properly.

HOW recognize occupational hazards and disease? The recognition of occupational hazards which may produce disease depends upon the use of thorough and extensive studies of physical equipment, processes, and substances used, associated with occupational analyses and histories of employees; physical and chemical determinations made on atmospheric and other samples, applying the principles of industrial toxicology both before and after such determinations; the rating of the efficiency of protective devices; and finally, the proper correlation of this information in the assessing of the possible hazard which may be present.

The recognition of occupational disease depends upon the proper adaptation of pre-employment and periodic examinations by physicians, and the data obtained therefrom, to the specific conditions of industrial exposure, both before and after disease occurs. Associated with this should be the indicated clinical laboratory tests which may further supplement the physical findings.

The real difficulty encountered in this type of work has been the inability of the proper integration of environmental exposure with the effects on the human body, as determined by clinical data. Generally speaking, the physician has not viewed the industrial environmental exposure as being a precise etiological factor in the production of occupational disease, and has not seriously considered whether employees going into specific types of exposure might have some physical defects or abnormal conditions aggravated or actual disease take place because of some physical predisposition. Nor has the physician, I believe, considered seriously the inefficiency or lack of environmental protection against specific exposure in the industrial environment and its possible effect upon the human body.

We need, therefore, a greater and more intelligent integration of the industrial and medical information, not by some person who is unqualified to do this, but by the physician himself.

HOW distinguish between occupational and non-occupational disease? This is a question which has been of considerable importance and will always remain so, for there will always be the necessity for this differentiation, as long as the responsibility for occupational disease rests with industry. Here we need clearly to have in mind that an occupational disease is peculiar and incident to the occupation in which it may arise, and further that non-industrial exposure or causes must be excluded. Thus the necessity is established for working out an adequate measure of the exposure, knowing its nature and severity, and further, a detailed consideration of the differential diagnosis between frank occupational disease and non-industrial diseases which may closely simulate occupational affections. Further assistance in this problem may be obtained through special clinical laboratory data and tests.

WHAT are the effects of occupational diseases? There are both general and specific effects of occupational disease, employees, employers, and insurance companies being primarily affected. Except in the states where provision is made for compensation, the employee may be subject to permanent or partial, temporary or total disability, or combinations of these—in many instances, becoming a burden upon society because he has ceased to be a producing unit.

The employer suffers certain tangible losses, such as increased labor turnover, increased spoilage of products, idle machines, increase of absenteeism due to disability, and other intangibles not so concretely expressed.

The insurance company, where coverage is arranged, must face the financial contingencies.

All of these results are reflected in the communities in which they occur, upon the general population; as an example of this, Dublin's statistics have shown that the life expectancy of an industrial worker has been seven years less than that of the non-industrial employee, although it has improved to the extent that five years have

been added, this being made possible through various factors such as preventive medical programs, decreased hours of labor and general improvement in living conditions.

We have no accurate data on the cost of occupational diseases, although damage suits pending over the entire country have been estimated to reach a total of $500,000,000, and as much as $2,500,000 in a single firm; we must add to this in states where such provisions are made, the cost of a hearing and compensation, which may amount to as much as $10,000 in each instance.

The legislative effects have reached one common denominator: that it would be better for all concerned to have occupational diseases under a properly written and adequately administered compensation act. It is expected, however, that legislation will be pending in a number of states for years to come.

HOW control or prevent occupational disease? The control or prevention of occupational disease is of the greatest consequence, and probably the most important aspect of the whole subject in the significance of occupational diseases. Quite likely the progressiveness of any industry will be largely determined by the application of all possible means and methods in the prevention and control of diseases due to occupational influence. The specific means for such control and prevention lie in the intelligent correlation of our present available methods in the plant, the laboratory, and the clinic, and, as has been stated before, the integration of such information through the industrial physician. The socio-economic implications of occupational diseases in their various aspects made this portion of the problem assume the greatest importance of any factor with which we are concerned. In short, prevention and control are the most economical procedures, viewed from any angle.

WHAT of future development? From what has been said, it can be readily foreseen that the development of a large body of data integrating the causal relationships with the physiological effects will ultimately become the basis for the determination of the principles of underwriting and compensation. Insurance companies, which are going to handle the underwriting of occupational diseases—and they surely will be underwritten by certain groups—have come to realize this, and will be very active in the development of such data. It, therefore, behooves industrial physicians and surgeons to appreciate the etiological factors and to correlate these with the clinical findings, in the ultimate objective of building up valuable records.

The responsibility of industry for occupational disease has been commented upon from time to time. Recently a representative of the American College of Surgeons stated that the policy of this organization for industry included the proper diagnosis and treatment of industrial injuries and occupational diseases.

Great anxiety has been expressed concerning those prospective employees or others who have been found to be unfit. It is well known that we have been subsidizing our tuberculous and insane for many years. Is it too much to expect that, as a part of the rehabilitation program in industry, subsidization of the industrial unfit would be impractical, in reference to occupational diseases?

The question of the development of adequate professional personnel is a serious one and involves a program which must extend through many years. Five years ago it was my privilege to present before a session of the American Medical Association a paper on "The Industrial Physician and the General Practitioner"; while some of the recommendations made at that time have been carried out in part, it seems to me that they still hold and I, therefore, quote from them:

"The answer is largely one of standards of excellence. One must go back to the student in the medical school. Curriculums should be so constructed and arranged that the medical student will be exposed to the fundamentals of industrial medicine. Not only must the undergraduate be provided for, but the postgraduate courses should be so correlated and so organized that greater opportunity will be presented for the promulgation of the basic fundamentals of industrial hygiene among established practitioners.

"More state and city health commissions should include industrial hygiene in their programs and investigations; county medical societies should more commonly have sectional meetings; hospital staffs should provide clinical material for periodic conferences.

"National and constituent medical associations should study the problems with industrialists; through such study, recommendations for standards and procedures could be given officially to industry; liaison arrangements of a flexible type governing relationships of the industrial physician and the general practitioner could be officially recommended."

Ophthalmology in Industry

By GEORGE H. CROSS, M. D.
Chester, Pa.

INDUSTRIAL ophthalmology has weathered the period of enforced inactivity of the late depression as well as have other scientific associated branches of medicine and surgery. Advances and improvements have been and are constantly taking place, though probably not as rapidly as formerly, yet, as industry has adopted finer methods of measurements and increased improvement of inspection along with higher standards of perfection, ophthalmology has kept apace. Thorough examination of eyes and proper fitting of glasses are essential to the worker who is expected to compete in the race for supremacy.

Unfortunately, unscrupulous non-medical individuals and firms have tried to take advantage of both employer and employee by offering a so-called "Eye Sight Conservation Survey" which is in reality merely a scheme to sell glasses to the worker under threat of losing his job, when failing to pass the test, unless he purchases a pair of spectacles.

I am heartily in favor of ocular examinations when made by competently trained ophthalmologists for the purpose of increasing the efficiency of workers in industry.

A few years ago I read a paper on the advantages to large corporations in having a consulting ophthalmologist on their staff, whose technical as well as scientific knowledge may be

of some assistance to industrial plant executives.

I would like to repeat some of these advantages:

1. The preliminary and necessary periodic examination and refraction of eyes.
2. The special examination and fitting of employees with glasses for exacting work requiring accurate vision.
3. The selection of goggles and masks with the proper optical glass.
4. The prevention of electric ophthalmia.
5. The use of various types of glass to eliminate ultra-violet and infra-red rays, when of sufficient intensity to be injurious.
6. The guarding of machines to prevent flying particles and sparks striking the eyes.
7. Proper illumination, sufficient foot candles of light, the elimination of glare, and the consequent reduction of eye fatigue.
8. The elimination or neutralization of fumes and gases causing inflammation and irritation of the eyes.
9. The training of personnel in the first aid dispensary.
10. Stimulating interest, activity and cooperation in safety committees.

On that occasion I spoke about the advantages of using carbolic acid applied to the denuded area of the corneal epithelium as a dressing. Following the removal of a foreign body I would like to stress a wider use of the corneal burr in the removal of the brown ring of burned or oxidized tissue so difficult to remove, and in the smoothing of the rough area left following the removal of a foreign body deeply embedded in the cornea. The burrs will remove the under cut edge so irritating to the lids, and greatly lessen the after effect when the injured employee still thinks the foreign body is present after the anesthesia has lost its effect.

Severe burns of the eye, whether by hot metals, liquids or chemicals — especially caustic soda which is used so much in industry — are very difficult to handle without the subsequent formation of partial or total symblepharon. If you will use promptly, glycerite of tannin, painting the eyelids with a cotton applicator dipped in the official solution, your results will be most gratifying.

Two years ago I presented before the College of Physicians, of Philadelphia, Section on Ophthalmology, a method of using thin silver conformers 17/1000 of an inch thick, around which was placed an extremely thin epidermal graft, to reline the eyelids and to cover the eyeballs.

This method was used in the case of a young boy who poured hot lead in a pipe with water in the bottom; the subsequent ankyloblepharon and symblepharon were corrected and he could open his eyes without moving the eyeballs at the same time.

I would like to call your attention to the great advantage of the gold ball (Dimitry) implantation in the scleral cavity over the other methods of enucleation, when it becomes necessary to remove an eye so badly injured that it cannot be saved.

I think we are all conversant with the fact that in the metals industry we are slowly and gradually finding that we are called upon to remove foreign bodies that were not even known a few years ago. In the use of cutting tools instead of the old fashioned, highly tempered, chilled steel we now find tungsten carbide, tantalum, and cobalt matrix, all non-magnetic in character, and we also find that more and more industrialists are using the non-magnetic metals, as manganese, monel metal, allegheny metal, and white metal, so that our methods of the removal of non-magnetic foreign bodies from within the eyeball have completely changed. In the past some men were able with a rather large incision over an accurately localized foreign body to remove it with a pair of forceps by direct illumination or by transillumination. These methods are applicable only when the foreign body is near the surface and in the anterior vitreous.

With your permission I will describe a method of removal of non magnetic foreign bodies it was my good fortune to originate. So far it has been successful in the 18 cases in which it was used. I feel that more and more we are to be called upon to remove these non-magnetic foreign bodies. The method depends upon the expert assistance of a roentgenologist thoroughly acquainted with the operation of a double plane fluoroscope.

Method

THE patient is placed on the fluoroscopic table and prepared as for any major ocular operation. Anesthesia is of great importance. Our success has been much easier and the length of time required considerably shortened since we have routinely used, in addition to local anesthesia, retrobulbar injections of 1% novacain which prevents the rolling of the eyeball. Previously, when we used local anesthesia and the Van Lint method of blocking, the patients would, while in a highly nervous state, change the direction of their vision, which frequently upset the operators ability to grasp the foreign body. An opening is made in the conjunctiva with scissors and a black silk suture placed in either side to hold the edges apart and to permit easy access and a clear view of the sclera. The incision is now made in the sclera in an equatorial direction about 6-7 mm. back of the limbus so as to enter between the limbus and the orra serrata, and centered at 12 o'clock, a slight right angle incision about 2 mm. long is made in the posterior scleral edge to permit ease of removal of the shot forceps with the contained foreign body. This type of incision is less likely to produce a retinal detachment later on.

In making the scleral incision care must be used to penetrate just through the sclera and not too deeply, in which case we would stir up vitreous unnecessarily. Dr. Edward Stieren, of Pittsburg, has devised an instrument called a scleratome to be used just for this purpose. The wire loop shot forceps are now introduced, closed, through the incision in the sclera and opened so the looped ends are in the approximate position of the foreign body. The lights are now turned off and the fluoroscopic operator, looking at the forceps and the foreign body in two planes, directs the surgeon to move the forceps so the fenestrated tips will be guided to the correct position and closed to grasp the foreign body, which will remain in the forceps, as the cross action serves to hold it firmly and tightly. The lights are now turned on and the forceps with the foreign body are withdrawn from the eye. An applicator moistened with carbolic acid is applied to the edges of the incision to increase the amount of

exudate formed and hold the tissues in a firm scar, then one or two sutures are placed in the conjunctiva, atropine is instilled, and the eye is bandaged.

Industrial Health

Notes on the Section on Preventive and Industrial Medicine and Public Health, American Medical Association, June 12, 1935.

THE scheduled program of the Industrial Health Session listed Chairmen's Addresses of the American Medical Association and of the Canadian Medical Association, the former being given by Dr. Robert H. Riley, of Baltimore, and the latter by Dr. W. J. P. MacMillan, of Charlottetown, P.E.I.

Other subjects and speakers on this program were as follows: "Some Observations on a Physical Survey of 47,000 CWA Employees in the State of Virginia," Dr. Fred J. Wampler, of Richmond, Va.; "Overcoming Hazards in Using Industrial Solvents," Dr. Allen Rogers, of Brooklyn; "Asbestosis," Dr. A. J. Lanza, of New York City; "Tuberculosis in Industry," Dr. R. Vance Ward, of Montreal; and "Importance of Industrial Hygiene and How It Can Best Be Handled by State Departments of Health," Dr. Albert S. Gray, of Hartford, Conn.

DR. ROBERT H. RILEY, in his Chairman's Address, spoke on "Preventive Medicine," giving a review of the evolution of public health activities as the background for his talk.

DR. W. J. P. MACMILLAN, in giving the Canadian Medical Association Chairman's Address, was very brief and made mention particularly of social insurance activities, reviewing the present position of this type of work.

SECTION SECRETARY Dr. R. R. Sayers, in the absense of Dr. Allen Rogers, gave a review of the principles used in overcoming hazards in using industrial solvents. In summarizing preventive measures, Dr. Sayers stated that the hazard should be enclosed; that there should be a balance between the fire, explosion and health hazards in the protection of workmen; emphasis was placed on the use of exhaust ventilation properly adapted and maintained; isolation of the hazardous processes was advised; the importance of good general ventilation was stressed; substitution of nontoxic materials for those known to have a poisonous influence, as a part of the program; the personal protection of employees is another vital element. Combinations of these methods are used many times in industry at present.

DR. ALBERT GRAY, in speaking on "The Importance of Industrial Hygiene and How It Can Best Be Handled by State Departments of Health," reviewed briefly the effects of industrial environment on health and the economic results of measures used to maintain good protection. It was early recognized that certain industries embodied characteristic hazards. Dublin's statistics on life expectancy of industrial workers were mentioned, and the fact that morbidity and mortality rates are higher in the industrial population also has a very definite effect upon the general community health. According to the census of 1930 there are 15,000,000 persons gainfully employed in the various industries, and there are also recognized 1000 different causes of ill health due to industrial influence. Within recent years there has been a tremendous increase in the incidence of cases of industrial sickness and also an increase in the insurance rates. The economic problem alone in this situation is commanding. It has been recognized that it is difficult for industry to do a good job in protecting its employees, and in Connecticut it has become a function of the Department of Health to carry out certain procedures which are recognized as being important in the protection of industrial employees. The similarity of the control program in industrial diseases to that of communicable diseases was sketched, with a brief description of technical methods and personnel necessary for such a program. In order to carry out this plan, it is necessary to have the cooperation of industry and the medical profession. Probably a great deal of the success of the work in Connecticut has been due to the fact that legally the results of investigations within industry cannot be used in compensation hearings or in any other legal way. The Bureau of Occupational Diseases at the present time is very much behind schedule, and there are very many more requests than can be granted.

DR. FRED J. WAMPLER, in speaking on "Some Observations on a Physical Survey of 47,000 CWA Employees in the State of Virginia," explained the purpose of the survey in the following way: (1) the government desired to safeguard employees and to accomplish good placement of workers; (2) the government desired to protect itself against unwarranted claims in the future; and (3) the government wished to render such local aid as was possible in giving work to members of the local medical profession, through this survey. An examination blank was prepared by a state committee and used in this study. In various tabulations, shown on lantern slides, it was noted that of the more than 47,000 employees surveyed 65% fell into Class A with no defects; 24% into Class B with slight defects; 10% into Class C with defects which permitted only light work; and .67% into Class D as unfit for any type of work. The study included both males and females, and negroes and whites. Acute gonorrhea and the occurrence of syphilis were the chief causes for putting into Class D. A tabulation of inguinal hernia in men showed the incidence under 45 years to be 1.4%, and 9.9% over 45 years of age. In reference to varicose veins, it was found that .9% occurred under the age of 25 and 3.7% over the age of 45. Regarding blood pressure, 34.1% showed a blood pressure of 150 mm. or over. It was found that the women were much better protected against smallpox and typhoid fever than the men. Smallpox immunization ran differently in the various age groups, varying from 90 to 60%; typhoid immunization varied according to age groups from 40 to 20%. The examination form used in this survey can be secured upon request. Finally, the study as a whole shows that the general population is not using the services of physicians as much as would be advisable.

Owing to a difference in meeting time between the preliminary program and the final program, there were two papers, those on "Asbestosis," by Dr. A. J. Lanza of New York, and "Tuberculosis in Industry," by Dr. R. Vance Ward, of Montreal, which were not given at this session.

Saranac Symposium on Silicosis

—A Bird's-Eye View of the Five-Day Saranac Lake Conference—

ALMOST successful second symposium on silicosis was held under the auspices of the Trudeau School of Tuberculosis at Saranac Lake, N. Y., June 3-7, inclusive.

All types of interested persons and groups were represented, including engineers, physicians, university research workers, casualty insurance companies, bureaus of occupational diseases, state departments of labor, and industrial commissions.

The following schedule shows the scope of subject matter, and the speakers:

Monday, June 3

"THE etiology of silicosis," DR. R. R. SAYERS, U. S. Public Health Service, Washington, D. C.

"Dust in atmosphere; methods of estimation and significance," DONALD CUMMINGS.

Tuesday, June 4

"PATHOLOGY of silicosis and silico-tuberculosis in experimental animals," DR LEROY U. GARDNER.

"Physiology of the fibrotic lung," DR. WILLIAM S. McCANN, Professor of Medicine, University of Rochester School of Medicine, Rochester, N. Y.

"Pathology of silicosis and silico-tuberculosis in human beings," DR. GARDNER.

Wednesday, June 5

"OCCUPATIONAL history in the diagnosis of silicosis," MR CUMMINGS.

"The clinical picture in silicosis and its importance to diagnosis," DR. A. R. RIDDELL, Ontario Provincial Dept. of Health, Toronto, Ont.

"Clinical aspects of silicosis," DR. H. H. KESSLER, New Jersey State Rehabilitation Commission.

"Census of cases of pneumonoconiosis in tuberculosis sanatoria and the effect of treatment," DR. DANIEL M. BRUMFIEL.

Thursday, June 6

"ROENTGENOLOGICAL diagnosis of silicosis," DR. EUGENE P. PENDERGRASS, Asst. Prof. of Radiology, University of Pennsylvania, Philadelphia.

"Correlation between pathological anatomy and x-ray appearance," DR. GARDNER.

"Roentgenological diagnosis of silicosis," DR. HOMER SAMPSON.

Friday, June 7

"MEDICAL methods in the control of silicosis," DR. RIDDELL.

"Engineering methods in the control of silicosis," PROF. PHILIP DRINKER, Harvard School of Public Health.

"Administrative control of silicosis in industry," MR. CUMMINGS.

"Silicosis as a social problem and its control," DR. A. J. LANZA, Metropolitan Life Insurance Company, New York.

DR. SAYERS commented especially on the definition of the word "etiology," and gave examples from various sources. Emphasis was laid particularly on quartz as being an important causative factor. Reference was made to the most recent study of the U. S. Public Health Service relating to the bituminous coal industry, and attention was called to the correlation of exposure factors with the clinical findings.

MR. CUMMINGS covered the details of dust estimation technique, including kinds of apparatus used, methods, and standards, related to concentration, particle size and quartz content. Special consideration was given to a discussion of comparative results when using light and dark field methods. Different kinds of dusts were mentioned and their significance commented upon, it being the feeling that the physical structure in a large measure determines relative toxicity. Particle size was particularly emphasized in relation to percentage occurrence in typical industrial dusts, with description and evaluation of available methods. It was believed that medical procedures offer a better approach to the evaluation of hazards than engineering technique, which is more applicable to control.

DR. GARDNER described methods of investigation relative to human material and experimental material, the former including pathology from postmortem specimens, chemical and petrographic analyses, and microincineration of sections; the latter embracing dust inhalation methods, injections of various types of dust suspensions and the means of estimating the capacity of animal tissues to react to silica. Discussion was given of the many problems relating to tuberculosis in experimental animals. A review of pulmonary anatomy was also presented. Of particular interest was the description of general reactions to inhaled dusts with relationship to protective mechanisms, avenues of disposal, localization and cellular reaction to silica and asbestos dust. The specific toxicity of silica was discussed, and the arguments for and against the solution theory weighed and evaluated. Details were given on the histogenesis of silicosis with illustrative lantern slides showing characteristic changes. Not the least important part of the presentation was the data on the modifying effect of other dusts inhaled with silica, demonstrating accelerating or inhibiting influences within the body or in the atmosphere. Considerable information was also given on various aspects of pneumoconiosis and infection.

DR. McCANN indicated that the physiology of the fibrotic lung involved complicated problems relating to the general physiology of respiration, the interdependence of the circulation and respiration and the phenomena of central nervous system control of these functions. Important subjects here were: total capacity, expansion, vital capacity and residual capacity relationships, dead space, circulation through the lung, diminished surface for air exchange and nervous reflexes.

The individuals studied were divided into six general groups according to predominating characteristics and the fundamental reactions observed and compared. The speaker emphasized the need for further research on this important study of functional conditions.

DR. GARDNER, in closing his discussion of human pathology, gave valuable information on lesions produced by silicosis, asbestosis, silico-tuberculosis and non-tuberculous infection, devoting special attention to various forms, progress of lesions, anatomic disability, sources of infection, character of reaction, method of spread, effects of non-siliceous dusts, and prognosis.

MR. CUMMINGS, in commenting on the importance of occupational history, believed that mere exposure to dust was not significant—occupational history should be confirmatory and should also be supplemented by physical findings. The history taking should be done by a person familiar with working conditions and the record kept separately from the examination report made by the physician. A special form for recording data on the occupational history was described in detail, and reference made to various points on the printed outline. It is possible to make periodic checks, using the initial record and later when sufficient data have been gathered to make a statistical analysis of the informational material.

DR. RIDDELL thought that complete clinical and laboratory findings were necessary in the diagnosis of silicosis and silico-tuberculosis. Dyspnea is the most common symptom but must be differentiated from orthopnea, so common in cardiac patients, exercise tests being useful here. Sleeplessness may be quite common. Night sweats and significant loss of weight usually mean infection. Dizziness and palpitation are concomitants of dyspnea. Cough is not symptomatic of silicosis but occurs without associated disease in persons exposed to irritating dusts, ceasing upon change of environment. Haemoptysis is not characteristic but suggests complications. The commonest sign is restriction of expansion and is better appreciated by inspection and palpation than by mensuration. Auscultation is more useful than percussion, the breath sounds being distant with shortened and high pitched inspiration and commonly accompanied by rhonci. Blood counts have not been found to be of distinct help. Blood pressure tends to be above normal, especially the diastolic reading. It is wise to have frequent sputum analyses, with cultures and guinea pig tests; persistence will usually uncover the organisms. A lantern slide demonstration showed chest films of some unusual cases, and corresponding pathological findings.

DR. KESSLER mentioned two ways of acquiring information on the incidence of silicosis: by the clinical examination of large groups of exposed persons, and analyses of morbidity and mortality data. In a series of over 6000 examinations, 250 showed what were thought to be significant findings; later after filming the chest and rechecking clinically, the number of positives was found to be 116. A critical examination of case and death rate data on tuberculosis in various industrially developed regions of New Jersey showed no unusual figures. The evaluation of disability is important for prognosis and medicolegally. In the estimation of disability, every man is a law unto himself and the biological role of adaptation is important. The personality characteristics are also of great moment. The diagnosis of silicosis does not rest on a single sign or symptom—all the information available should be intelligently used. A series of interesting case histories was presented, illustrating pertinent points.

DR. BRUMFIEL was pleased to note a favorable change in attitude relative to the prognosis of silico-tuberculosis. A preliminary survey of 80 sanitoria showed 300 case records available for analysis. It is hoped that a system of central reporting can be devised and that means will be supplied for the adequate study of the case records mentioned, as well as continued collection and study of others.

DR. PENDERGRASS first alluded to the American Public Health Association definition of silicosis, and standards for roentgenological interpretation formulated by a special independent committee. Detailed discussion was given on fluoroscopic examination and film findings of the heart, lungs, and diaphragm; type of film necessary; adequate equipment; and proper technique of exposure and development. Lantern slides of chest films demonstrated various conditions to be differentiated from silicosis.

DR. GARDNER gave an excellent presentation correlating the pathological findings in gross and microscopic specimens with the roentgenographic changes as provided by the standards agreed upon by the special committee above mentioned. This had reference to markings within normal limits, simple silicosis and silicosis complicated by infection.

DR. SAMPSON thought that the normal pulmonary shadows required less description than understanding. It is important to appreciate that the perceived shadows of normal type are vascular structures. Special attention was given to the evolution of shadows by various steps, as illustrated by a lantern slide demonstration of chest films. Differential diagnosis was emphasized by examples of especially selected cases. The chest film represents so-called "living pathology" existing in the physical structure of the lung. The difference in changes was shown by typical films from persons working under varying conditions of dust exposure.

DR. RIDDELL gave a review of the Ontario plan and other acts, stressing the operative points regarding medical control. The need for rehabilitation provisions and the clarity of the silicosis-tuberculosis relationship received special comment. A statistical analysis of the Ontario experience covering 1926-34 was presented with detailed explanation of the most striking facts.

PROF. DRINKER believed that the engineers must recognize the importance of medical control. However, it is of equal moment to set up a reasonable objective by the use of dust stan-

dards. Methods of dust control consist mainly of substitution of nonhazardous processes for known hazards; control of dust at point of origin (through wetting, isolation and local exhaust); by general ventilation; and by respirators. Particle size of dust is of considerable consequence, and the control of this factor is a significant engineering accomplishment. Special mention was made of the proper use of air-supplied devices. The relative merits and special adaptation of collecting apparatus were described, including cyclone types, cloth filters and dust traps.

MR. CUMMINGS indicated that experience and authority in the administrative problems of silicosis in industry can be definitely improved by the use of proper technique and adequate personnel. An appreciation of the part played by tuberculosis would greatly assist in a better understanding of the silicosis situation. As substantial aids in the achieving of more favorable results the following points were named:

1. Reliable information (gained through dust surveys, physical examinations, analysis of mortality data and postmortem findings);
2. Reduction of hazards; and
3. Establishment of employment standards.

DR. LANZA observed that there had been a change in the legislative situation during the past year. It was thought that provisions for a medical board should be made where compensation laws are to be put into effect. Disability should be the basic criterion for the payment of compensation. There will probably always be the necessity for differentiation of occupational disease and non-occupational conditions. It is reasonable to think that the same methods of control as used in accidental injuries could profitably be applied to occupational diseases with equally salutary effects.

The second symposium on silicosis as sponsored by the Saranac group was considered to be very successful. A detailed account of the proceedings will be published as soon as the material can be properly arranged.

Among the Origins

1. The Allis Mutual Aid Society

By LOUIS ALLIS,
President, The Louis Allis Co.,
Milwaukee, Wis.

EVERY now and then I like to sit down and "reminisce," and right now I would like to mention the original Allis Mutual Aid Society which was started back in 1877.

In that year, my late father, Edward P. Allis, founder of the Edw. P. Allis Co., now the Allis-Chalmers Co., gave a house-warming party in a new building down on Clinton Street, and after the house-warming—which was run by the employees—there was a small amount of money left and nobody knew just what to do with it.

Upon a conference with my father and the men, it was decided to establish the Allis Mutual Aid Society, with monthly dues, each monthly payment being duplicated by the company. Back in the '70s and partly through the '80s this Aid Society took care of and helped only those in financial trouble and those having illness at home.

During my college career, and before I graduated in 1888, I became very much interested in medicine and surgery, and I frequently visited the Johns Hopkins Hospital, at Baltimore, and became more and more interested in peoples' care.

This prompted me, in 1892, to establish, in the Edw. P. Allis plant, a first-aid organization. I got together about 50 men, two or three from every department, and had a surgeon give them lectures once a week for half a year on first-aid care.

In those old days, the usual treatment was covering the wound with a quid of tobacco, shavings, and shellac, or cobwebs, and one can readily understand what the germs did to the poor patient.

After the course of lectures was completed, I was instrumental in getting the company to build an operating room at the factory, and a two-bed ward, so that people with serious injuries could be immediately taken care of.

This was before the age of the automobile, and it was often difficult to get a surgeon in a hurry, and frequently our first aid men were able to set arms and legs and make the splints out in the pattern shop. I remember one instance where the pattern maker set a leg, and the surgeon said he could do no better.

My interest in surgery took me frequently to the Children's Hospital in Milwaukee, at which time operating tables were usually made of slabs of oak. One can imagine how dirty they got.

I had seen a plate glass operating table at Johns Hopkins; and I went into the shop and had the boys build, out of gas pipe, an angle-iron table and fit it with a plate glass top; and that table was used at the Children's Hospital for some 25 years. Cleanliness, at least, was starting way back then.

At the time we established the first aid committees in each department, we put, on a central post, a tin line of shelves on which we kept soap, carbolic acid and bandages. We also kept a tin pail of water at that post.

Immediately upon an accident of any kind a bell was rung, and anywhere from one to three men of the first aid men in the department went to the post and immediately took care of the wound. At that time things antiseptic were considered, but the question of aseptic treatment was not as thoroughly placed in the minds of people as it is today. In any event, I feel that back in 1892 the old Edw. P. Allis Co. was ahead of the times, as, in addition to having an Aid Society, it had trained and disciplined first aid individuals, as well as an operating room, a double-bed ward and a horse-drawn ambulance.

Sickness

THE U. S. Commission on Industrial Relations in 1915 estimated that 30,000,000 industrial workers in the U. S. averaged nine days of sickness per year, or 3% of their total time. Florence, after an exhaustive study of all the available data on industrial ill health, concludes that men, on the average, are sick 6.75 days in each year, and women eight days. On the basis of a total working population of 42,000,000 today, at least 300,000,000 man-and-woman-days are lost by sickness, or the equivalent of 1,000,000 workers always idle."*

*"The Tragedy of Waste," by Stewart Chase, p. 138.

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Results of X-Ray Chest Examinations

—Among 2500 Workers in a "Heavy Industry" Plant—

by

LOUIS M. WARFIELD, A.B., M.D.,
Milwaukee, Wisconsin

THE question of dust hazard in industry has raised problems for employer and employee. Men have to work at processes which by their very nature are dusty, and yet the work must go on in order to supply finished products for our complex civilization. Up to a few years ago not much attention was paid to the hazards inherent in dusty occupations. Not that disease produced by dust was unknown, for lung disease as the result of inhalation has been known since the writings of Hippocrates.

Pre-employment examination of workers has been practiced in many industries for some time. However it has been only within the past year or two that, except in certain places, and following the recognition of the enormous numbers of men affected with lung disease, certain employers are demanding not only a general physical pre-employment examination but x-ray examination of the lungs as well. This is particularly true in the dusty trades, such as granite-cutting, mining, foundry work, sand-blasting, etc. In the study of flat films taken from workers in all departments of a large plant producing machinery, from the heaviest to the small pieces, opportunity is given to do more than discover the workers who have reactions to silica dust in the lungs. Many abnormal conditions of the heart, bony framework, diaphragm, and diseases of the lungs other than that produced by silica are suggested or actually diagnosed, so that it becomes a helpful method of preventive medicine among the workers. It supplements and extends the general pre-employment physical examinations.

In one large industry in a small city, a suburb directly west of Milwaukee, which employs about 3500 men and a few women, and which carries its own compensation insurance, the far-seeing, socially-minded executives equipped a complete x-ray laboratory, employed a competent x-ray technician, and gave me the opportunity of examining and reporting on the films of the chests of the employees.

The plant has two large foundries where all the usual processes incident to such work are done. There are machine shops, erecting shops, electrical winding and welding shops and pattern shops. Huge electrical generators are made, from the patterns to the completed machines.

	Total	Negative	Positive	Remarks
Foundry No. 1	479	380	96	
Foundry No. 2	212	182	28	
Foundry Brass	35	31	4	
Forge Shop	90	87	3	
Boiler Shop	88	84	4	
Shop I	65	65	0	
Shop II	110	110	0	
Shop III	69	68	1	Miner 37 years.
Shop IV	6	6	0	
Shop IV-1	88	86	2	Miners 37 and 16 years.
Shop IV-2	16	16	0	
Shop V	7	7	0	
Shop V-1	23	22	1	Miner 12 years.
Shop V-2	80	79	1	Miner 14 years.
Shop VI	9	9	0	
Shop VI-1	27	26	1	Miner 8 years 25-33 years old
Shop VI-2	57	57	0	
Shop VI-4	79	78	1	34 years. Miner 10 years, 15-25 years.
Shop VIII	24	24	0	
Erecting II	49	49	0	
Erecting IV	4	4	0	
Erecting V	11	11	0	
Erecting VI	6	6	0	
N. Gallery I-II	117	117	0	
S. Gallery I-II	21	21	0	
Gallery IV	64	64	0	
Tractor I-II	312	312	0	58, 60, 60 years old.
Lagging III	20	17	3	12 yrs. in Roumania, 13 years Germany.
All other jobs	329	329	0	Moulder 20 years.
	2500	2355	145	

Table 1

The chief interest was of course in the x-ray chest films of the foundry workers, as it was actually only in the foundry that there was a recognizable dust hazard. However, a chest film of every employee in all the various shops was made, and a few films of employees in the main offices.

Routine Method of Making Films

IT WAS decided that, as routine, a single P-A film, 5-foot focal distance, 75 to 80 K.V. 100 M-A., 1/10 sec. exposure would be taken. The machine is one of the recent four-tube types and can be very accurately calibrated. If the flat film could not be certainly read for pathological

changes in the lungs, a stereo-set was made. We feel that this method has been entirely satisfactory. After examining over 4000 chest films this past 18 months, the writer feels that the flat film is quite satisfactory in the examination of workers in the foundry or for those applying for work.

Distribution of Employees

TABLE 1 gives the distribution of employees in the various departments.

In the two large foundries 691 men had chest films made. The ages varied from 18 to 80 years. Scattered cases of silicosis were found in several of the machine shops, but in every case the past occupational history revealed work in copper or iron mines for periods varying from 10 to 37 years. The only silicosis cases which developed among the 2500 workmen (including 113 women) in this study were found in the foundries, boiler shops, brass foundry and forge shop. The cases in the shops other than the foundries were very mild and were not considered to be of any significance.

ers and granite cutters. There were none of the massive infiltrations seen among the 2500 workers in this series.

An explanation of the difference noted above is no doubt found in the concentration of silica to which the two kinds of workers are exposed. Foundry work exposure is rarely continuous at high dust concentrations.

Classification of Silicosis

THE current separation of cases of silicosis into First, Second and Third stages is not satisfactory. More elaborate classifications, such as the one Drs. Pancoast and Pendergrass[1] use, seem too cumbersome. After all there is no sharp line of demarkation among the stages, it is all silicosis and a simple classification which enables any reader to gain a concept of the lung picture from a writer's description would seem desirable.

It is exceedingly doubtful if the most expert roentgenologist can make a certain diagnosis of so-called first stage silicosis even if he has the occupational history of the subject. It is well-recognized that hilum shadows are so variable in size and density in normal lungs that opinion based upon the hilum appearances is likely to be incorrect. The added criterion of the first stage, namely, "more fibrosis than normal," is also a limber reed to hold up an opinion.

Simson[2], on the basis of carefully reconstructed models of the early silica nodule, comes to the

Kind of Work	Color	Sex	Negative	±	+	++	+++
Moulder	W	M	156	0	23	20	
Moulder	C	M	3	1	0	0	
Laborer	W	M	97	1	10	14	1
Laborer	C	M	21	0	0	0	
Core maker	W	M	99	3	8	5	
Core maker	W	F	10	0	0	0	
Chipper	W	M	56	0	10	4	
Chipper	C	M	6	0	0	0	
Crane man	W	M	41	2	4	1	
Sand-Blaster	W	M	6	0	3	3	
Sand-blaster	C	M	3	1	0	0	
Grinder	W	M	5	0	0	0	
Handy man	W	M	7	0	0	0	
Repair man	W	M	4	0	0	0	
Scale clerk	W	M	2	0	0	1	
Blacksmith	W	M	3	0	0	0	
Hitcher	W	M	3	0	1	1	
Mixer	W	M	1	0	0	1	
Trucker	W	M	5	0	0	0	
Trucker	C	M	0	1	0	0	
Cupola tender	W	M	9	0	1	4	
Winder	W	M	1	0	0	0	
Sandslinger	W	M	4	0	0	1	
Carpenter	W	M	1	0	0	0	
Electrician	W	M	3	0	0	0	
Tool room man	W	M	2	0	0	0	1
Core baker	W	M	2	0	0	0	
Watchman	W	M	1	0	0	0	
Machinist	W	M	4	0	0	0	
Fireman	W	M	2	0	1	1	
Clerk	W	M	2	0	0	0	
Cleaner	W	M	0	0	0	1	1
Heater	W	M	1	0	0	0	
Oiler	W	M	1	0	0	0	
Office	W	M	6	0	0	0	
Office	W	F	1	0	0	0	
Totals			562	9	61	57	3

Table 2. Foundry Workers

The percentage of colored men in the foundries who have demonstrable silicosis compared to the percentage of white men is 13.3 to 5.9. This could hardly be taken to mean that colored men are more susceptible to silicosis than white men, as the number of colored men is too few.

The most striking comparison brought out in these examinations is the evident difference between the lesions produced by silica inhalation in general foundry workers (on the one hand) and those produced (on the other hand) by silica inhalation in granite cutters. The only comparable conglomerate lesions are those seen in sand-blast-

1. PANCOAST, H. K. and PENDERGRASS, E. P., *J. Indust. Hyg.*, 16: 327, (November) 1934.
2. SIMSON, F. W., Reconstruction Models Showing the Moderately Early Simple Silicotic Process and How It Affects Definite Parts of the Primary Unit of the Lung. *J. Path. & Bact.*, 50: 37, (January) 1935.

definite conclusion that "the discrete nodule is a sharply defined lesion . . . There is no evidence of "beading" of the larger vessels and bronchi from proliferative changes in the related lymphoid tissue."

It is admitted that if one had a series of films of a worker exposed to silica dust from his first employment through a term of years, then at some stage it might be possible to form an opinion of beginning silicosis from the appearance of the hilum shadows. The basis for classification used in this study is mild (+), moderately severe (++) severe (+++) the last corresponding to coalescence of nodules into large masses of varying size from 1 cm. in diameter upwards. Mild cases are those with discrete nodulation in the mid or lower portions of the lungs, the nodules less than two millimeters in diameter. The moderately severe are those with more extensive distribution of nodules but still discrete, measuring from two to 10 millimeters. Not much attention could be paid to hilum shadows in diagnosis. There are cases of silicosis (++) with no considerable increase in the hilum shadows, and on the other hand cases of young men with absolutely no history of exposure to silica and with clear lung fields, no cardiac lesions, and large hilum shadows.

25 to 35, then for six years a porter and cook, then for the past nine years a foundry laborer; a white man 71 years old, who had been a cleaner in foundries for over 50 years. None of these men complained of any symptoms.

Progression of the Silicotic Lesions

THERE has been a very general opinion held that lesions of silicosis, once begun, tend to slow progression even when the men are removed from the dusty occupations. The evidence presented by the South African group and by our American investigators on the miners and granite cutters appears incontrovertible. Individual predisposition must play a very decided role in the question of progression after moderate lesions have developed. The fact that there were only three severe cases among the 691 men in this foundry would seem to indicate that usually in foundry workers the lesions do not progress rapidly. This might also be inferred from the fact that several men had worked over 40 years and show very little evidence of silicosis, and others who had worked about the same length of time show no lesions. No case of progressing lesion has been seen from men in this foundry, but a few cases have been seen from other foundries in this

Healed Tuberculosis with Silicosis

Age 40-49	50-59	60-69	Occupation	Years at plant	Site of healed lesion
	56		Moulder	16	Right apex
	54		Laborer	10	Large nodule right base
	56		Core maker	20	Right lower
		65	Core maker	17	Infiltration 2 R. i. s.
49			Chipper	10	1st right i. s.
40			Moulder	21	Left apex
42			Moulder	15	Upper left lung calc. nodules
	58		Moulder	25	Calcified nodule l. lower
46			Moulder	13	Rt. apex calc. spots
	55		Moulder	10	Right apex
	59		Chipper	8	Left apex

Healed Tuberculosis with no Silicosis

Age 40-49	50-59	70-79	Occupation	Years at plant	Site of healed lesion
46			Core maker	24	Large focus calc. rt. base
43			Laborer	10	Right apex
46			Fireman	13	Right Apex
	53		Core maker	18	Right upper
45			Moulder	22	Left 1st i. s.
	54		Laborer	20	Adhesion l. costo-phrenic angle
	50		Sand-blaster	6	Adhesion l. costo-phrenic angle
43			Core maker	27	Right apex
	50		Moulder	12	Adhesions both
		70	Moulder	23	Scattered ca. nodules
	50		Core maker	26	Left mid zone
	56		Moulder	36	Left 1st i. s.
45			Core maker	22	Right apex

Table. 3. Cases of Healed Tuberculosis in Silicotic and Non-Silicotic Lungs

As the study was made on flat films (admittedly not the best way to diagnose silica infiltration) a group of doubtful (±) was made. All these cases will be photographed with the x-ray again in from 12 to 15 months. It is likely that all these doubtful cases will then be classified either as negative or as mild.

Study of Table 2 shows that of the 691 workers in the two large foundry shops 8 were ±, 61 were +, 57 were ++ and 3 were +++. These last were, respectively, a white man, age 60, a foundry laborer for 29 years; a colored man 50 years old who had been a hard-rock miner for 10 years from age

area where the lesions appeared to progress without any added tuberculous infection.

The final answer to this question can be given only after a period of several years' observation. By re-taking films of the men yearly it is hoped that eventually some definite information will be obtained in regard to foundry workers.

Tuberculosis and Silicosis

IN TABLE 3 the cases are listed which show "Healed Tuberculosis with Silicotic Lesions" and "Healed Tuberculosis with Otherwise Normal Lungs". There are 11 of the former and 13 of

the latter. The only case of active tuberculosis seen was in a man 38 years old who applied for work at this foundry. He had been a core maker for 18 years in several other foundries in the city. There was no evidence of silicosis.

With tuberculosis such a widespread disease and with evidence of childhood healed infection in 100% of the workers in this study it seems strange that there was no active tuberculosis among the 691 foundry workers. However there is evidence that tuberculosis in the presence of mild or moderately severe silicosis heals as it usually does in non-silicotic lungs.

This raises the question of the accuracy of the widely accepted view that silicosis activates tuberculosis. The animal experiments seem quite

Man	76 Years	Moulder	52 Years	Mild silicosis	
Man	56 Years	Miner	25 Years	Laborer foundry 7 yrs.	Moderate silicosis
Man	44 Years	Moulder	25 Years	Negative	
Man	51 Years	Moulder	34 Years	Negative	
Man	58 Years	Moulder	14 Years	Jugo Slavia, 25 years. U. S.	Moderate silicosis
Man	47 Years	Chipper	29 Years	Negative	
Man	56 Years	Moulder, began Germany at 14 yrs., 42 yrs. Moulder.			Mild silicosis.
Man	80 Years	Chipper	22 Years	Negative	
Man	71 Years	Cleaner	21 Years	Advanced silicosis	

Table 4. Varying Susceptibility to Silica Inhalation

conclusive, yet one must bear in mind that, however carefully animal experiments are performed, conclusions drawn from the experiments can only be true for the animal treated in some particular way. Only by analogy can one transfer results to humans. One has no right to conclude that because animals react under artificially created conditions, humans will react similarly under natural and widely different conditions.

In hard-rock miners, in granite cutters, in pottery workers and other trades where percentage of silica is high and concentration of dust great, tuberculosis is apparently a serious complication of silicosis, particularly after 40 years of age. Statistical studies of mortality in pulmonary tuberculosis show that in the age period 15 to 45 years it still leads all causes of death in Wisconsin. The highest mortality in the silico-tuberculosis cases occurs in the 45 to 60 period, a period when tuberculosis mortality in the general population is decreasing and deaths from heart disease are increasing. My own feeling is that the

Ages	19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	Total
Positive		4	21	53	45	18	3	1	145
Negative	19	657	627	578	321	126	25	2	2355

Table 5. Summary of All Cases Positive and Negative Silicosis

infection is not a reactivation of an old partially healed focus but a re-infection from without, exogenous in character. To me this is a more understandable point of view.

There seems to be a difference in the type of silicosis among the foundrymen and the granite cutters, etc. The silicosis is milder and as a rule does not lead to disabling conditions. Tuberculosis appears to heal in these silicotic lungs as it does frequently in non-silicotic lungs. Also in the foundry workers who have no demonstrable silicosis but are exposed to the same atmosphere as are those who have developed silicosis, tuberculosis acts as it does in the general population.

In this particular foundry the menace of tuberculosis appears to be no greater than it is in the city at large. Among the 2500 men and women in this study only three showed x-ray shadows interpreted as active tuberculosis, one of whom had widespread bilateral infiltration but was still at work as a clerk.

A further interesting observation is that increased linear markings and beading of the linear markings was not found in the silicotic lungs but in the lungs where healed calcified nodules, presumably due to tuberculosis, were present. Linear markings are made up of bronchi and arteries and strands of fibrous tissue. The lymphatic channels run in the adventitia of the arteries. Any process which thickens the arterial walls, thickens the bronchial walls or produces nodulation in the lymphatic channels will produce increased streaking on the x-ray film. Silicosis is probably not the cause of the increased linear streaking. Tuberculosis appears to be the most important cause of the increased linear streaking in films of young men and women. In the older age groups some more evident linear streaking is normal owing, most probably, to pulmonary arteriosclerosis.

It is not intended to leave the impression that there is no advanced silicosis in foundries, or that in some foundry workers with advanced silicosis the added infection of tuberculosis does not lead to the usual lesions described in the literature. This particular foundry has always been known to be a relatively clean foundry. Some other foundries are notoriously dirty and dusty, and the hazard for the workers is necessarily greater in such shops.

The contention is that in the light of what we now know of dust hazards it appears feasible to reduce the hazard materially. Even in this particular foundry where tons of dust were removed from the rafters and ledges in the last year's clean-up, men had worked for 30 years and over and show no signs of silica in the lungs.

General Remarks

INDIVIDUAL predisposition plays an important role here just as it does in susceptibility or immunity to bacterial infections. For example: There is one man aged 76 years who has been a moulder for 52 years. His lungs show very mild silicotic lesions. One man, 56 years old worked in the Michigan iron mines for 25 years, then was a foundry laborer for seven years. His lungs show moderate nodular lesions. One man 51 years old was a moulder for 34 years. His lungs show no silicosis. One man 47 years old has been a chipper of castings for 29 years. His lungs are

normal. One man, 80 years old, a chipper for 22 years, shows no lesions. Another man 56 years old began work as a moulder in Germany when 14 years old, has been a moulder for 42 years and has only mild lesions.

On the other hand there were four men between the ages of 20 and 29 who had what was considered to be very early lesions of silica inhalation. Each one of these four had begun work before he was 18 years old. The dust hazard naturally varies in different parts of the foundry at different times. One man's work may bring him into constant contact with air highly charged with minute particles of silica dust, while another man may be only intermittently subjected to highly dust-charged air. One does not know why these four young men show early lesions unless it be that the earlier ages are more susceptible than the later ages.

The figures show that over half of the cases of silicosis occurred in the age period 40 to 60, and the largest percentage of cases to numbers of workers occurred in the sixth decade. The majority of these men had been working in foundries all their working lives. None of the lesions was more than what is known as second stage, that is, there were distinct nodules from 2 to 3 millimeters in diameter in the mid and lower lung fields. The hilum densities were not always increased.

Other Conditions

THERE were 2355 films negative for silicosis in the whole group. There were 691 foundry men, of whom 562 were negative.

Among the 2500 there was one complete situs transversus. There were three men who had eventration of the left diaphragm. One was a young man of 27 who has been a core maker for nine years. A second case was a man 69 years old who had been in this foundry as a laborer for 14 years. The third case was a man 35 years old who was a drill press operator.

	Positive	Negative	Total	Positive	Negative
White	141	2321	2462	5.9%	94.1%
Colored	4	34	38	13.3%	86.7%

Table 6. All Laborers in All Departments

There was one case of bronchiectasis confirmed by physical examination and symptoms, and one case of a mass at one hilum which was thought to be cancer.

Only one case of true aneurysm was found. This was a man of 54, white. The blood Wassermann reaction was positive.

Various heart lesions were found, the most common being arterio-sclerotic, as there was a large proportion of men over 55 years of age among the workers. One case of huge heart, mitral stenosis and insufficiency with chronic passive congestion, was seen.

Summary

IN THE x-ray examination of flat films of 2500 workers in a heavy industry plant, 527 men were found to have some abnormal findings. The majority of these were compatible with good health and working ability, such as unusually large calcified nodules in the lower lobes, costophrenic angle adhesions, dilatation or elongation of the arch of the aorta, etc.

There were 691 foundry workers, of whom 129 had demonstrable silicosis.

A classification is proposed, based entirely upon nodule size as fibrosis and hilum densities appear to be too inconstant to be used as criteria in diagnosis. Silicosis among foundry workers appears to be somewhat different from that in granite cutters or sand-blasters. It seems to be of a milder, slower progressive type and not to be complicated with tuberculosis so far as this study is concerned. The impression gained from this study is that it is entirely feasible to conduct foundry operations so that the dust hazard will be so little that men may work in them all their lives with no more limitation of their working capacity or no more risk of acquiring tuberculosis than workmen in any other occupation usually regarded as non-dusty.

Industrial Nurses

Their Value to the Safety Movement

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MODERN civilization is built largely on four great institutions: the home, the church, the school and the place of gainful industrial employment; to these might also be added the hospital which is so vitally necessary in the care of many emergencies and hazards of life having to do with sickness and accidents.

In the development of each of the above-named institutions the profession of nursing has been more or less intimately associated. Thus we have home or visiting nurses, either private duty or public health nurses; nurses associated with religious organizations and other public and private agencies, including universities or colleges, rendering hospital services; school nurses; and industrial nurses who may carry on their work in connection with and as a part of various manufacturing plants and operating concerns.

Industrial Nursing

ALTHOUGH nursing in industry has developed largely in the thickly populated industrial states, it curiously enough was in the more rural and agricultural state of Vermont where industrial nursing first started in the United States. In 1895 the first graduate industrial nurse in this country was employed by the Vermont Marble Company, since which time industrial nursing has become more and more recognized as a profitable preventive measure, and has been extended to most other parts of the country not only for its technical and humane values but also for its value as one factor in personnel and industrial relations service which should seek to bring out and develop the best qualities in each employee and to weld that best into effective business cooperation.

An industrial nurse may be defined as a trained nurse specializing in an industrial organization. She must have certain qualifications of intelligence, character and health, as well as hospital

* Paper presented at the North Carolina Safety Conference, Durham, N. C., May 10, 1935.

training, public health training and industrial health training. She is not a doctor, not a detective, not a truant officer, and not a medical policewoman.

According to the Federal Census of 1930 there were at the beginning of the present economic depression approximately 3,000 trained nurses engaged in industry throughout the United States, the largest number of such nurses naturally being found in the congested urban and industrial states. Manufacturing and mechanical industries, wholesale and retail trade organizations, transportation and communication systems, hotels, mines and quarries were the industries which employed the most nurses.

As a result of the depression, various industrial personnel activities, not the least of which were health conservation, medical and nursing services, have been seriously curtailed. One of the chief objectives of economic recovery should be to reinstate these services and to replace these valuable workers so that they may continue to serve in the reduction of accidents, the conservation of human life and the prevention of further economic waste. In addition to these re-employed industrial nurses there remains the oportunity further to extend nursing service to the vast number of larger and smaller industries so far uncovered by adequate health and safety protection.

As in the administration of industrial medical services, so also in the organization of industrial nursing services, a very wide range of practice may exist; some companies, owing to their smaller size and local conditions, may have to depend on the services of private nurses or community nursing agencies for services to employees, while other companies, particularly of larger size and those involving special hazards, may be in position to develop their own industrial nursing staffs.

According to the type of health program carried on in the industry, the industrial nurse may be responsible either to a company physician (full time, part time, or on call) or to a personnel or operating official. Her duties also will vary to include preventive or curative activities or both; and her work may be carried on wholly inside the plant or offices in giving first aid, doing routine nursing work, making sanitary inspections and supervising health educational activities; or outside in home visiting and instruction; or she may combine both inside and outside duties.

In addition to the above duties, a nurse may be employed for rather broad personnel activities not absolutely requiring the services of one with a nurse's training, but in which knowledge of nursing methods and practices gives her a better opportunity to understand and quietly assist in solving the company's sickness and accident problems.

It may be said that a nurse in industry can be of greatest service in furthering the efficiency of the workers and the success of the business by conceiving her job as one in which her friendliness, cooperation and tact must be combined with her professional duties, whatever they may be, and in which her chief objectives always should be education and prevention. She should have knowledge of the operating procedures and personnel policies of the company and should make contacts with the management and employees of the production or operating department as an assistant in health education, sickness and accident prevention within the plant, or in visiting cases of sickness or injury in the home. Without the direct or indirect supervision of a physician she should not attempt to contact employees in or out of the plant on matters involving the actual treatment of sickness or accidents.

Accident prevention and safety work have been the most enthusiastically supported of all personnel activities in industry. In all parts of the United States, largely through the leadership and influence of the National Safety Council and the various state safety organizations, industrial accident rates have been cut to one-half, or less, of their former prevalence, and many cities have been able to do practically the same thing in the case of traffic accidents. In the public safety field —where the greatest number of accidents must be combated — the safety movement has been showing definite gains in the saving of human life, especially among children.

Value of the Nurse in the Safety Program

THE value of the industrial nurse may be said to be almost equivalent to that of the operating official or safety engineer and the company physician, in the leadership and administration of an accident prevention service. The safety director or engineer, the industrial physician and the industrial nurse constitute an ideal safety triumvirate, which in football parlance should be considered the greatest "triple threat" that possibly could be developed to combat the advance of accidental injuries and to win the victory over disability, loss of time from work, suffering and distress; and while programs and personnel must vary according to local conditions and needs, it may be stated that in a complete, ideal accident prevention service at least one-third of the activities should involve nursing personnel.

Home Safety of Employees

IN ADDITION to the primary function and value of the industrial nurse in promoting the safety movement in factories, shops and other places of work, and in helping to put into practice the details of the program as outlined previously, attention should be called to the opportunities which the industrial nurse may have to assist in the education of employees and their families with reference to accident prevention off the job—in the home, in the school, in travel and in public places generally. In a recent study made by one industrial organization it was found that there were over three times as many accident cases occurring off duty compared to those suffered by employees while on duty; and there were over five times as many days lost from work due to accidents off the job as compared with those while on duty.

One of the greatest opportunities of an industrial nurse for real service may be in the education of employees on the prevention of accidents in their homes. Only in the field of home safety do accidents continue almost unabated. Possibly some of the lack of organized effort to prevent accidents in the home has been a reflection of our attitude that "a man's home is his castle." There also has been a feeling on the part of safety organizations that they would meet with considerable difficulty, or actually have no right to attempt to enter the private domain of the home, with a program of regulation and education.

Safety in industry, in the school, in public places and in travel has been built largely on the com-

bined foundations of enforced regulations and education. In the home, on the other hand, most of our results in reducing accidents must be accomplished through education alone. Both the human element and the home environment are the factors to be considered. To a large degree, the problem is one of education of individuals, preferably in employee, family and home groups. Ignorance and indifference must be dispelled, and proper methods of using home facilities and equipment must be taught.

Health and welfare problems more and more are being solved with the family and home as the unit to be considered. So, also, many of the problems of safety must be approached through the home not only for the benefit of the home itself, but also in the interest of furthering all phases of human safety. As one of the agents in such work, no one is of more potential value than the industrial nurse. Her entrance into the confidence of employees and into the inner circles of employee family life already has become welcomed as a matter of custom in many communities; and her influence as a messenger and teacher in the home as well as in the place of work is becoming more and more recognized.

Instruction on safety should go hand-in-hand with instruction on health in general; health and safety cannot easily be divorced. Accidental injuries often lead to ill-health, and physical or mental ill-health frequently contributes to the incidence of accidents. Moreover, the word "health" is derived from a word meaning "whole." To be healthy, or whole, presuppose a normal condition of the body and mind with all parts functioning properly and free both from disease and the results of accidental injury.

University Teaching Facilities

FINALLY, it may be suggested that in our great institutions of learning for the benefit of ali college students and particularly in our medical and nursing schools located in urban, industrial centers, adequate facilities should be developed for the teaching of safety. Student nurses as well as prospective doctors should be taught the principles and practice of accident prevention as a part of their instruction on health conservation, preventive medicine and public health; and adequate graduate instruction should be made available for those planning to specialize in these fields. When feasible, departments or sub-departments of industrial hygiene and safety in medical or nursing schools should maintain close cooperative working relations with the industries of the community, to the end that some of the members of the medical and nursing staffs of local industrial organizations may be represented in the school teaching staffs. A "practical" teacher of industrial hygiene or safety who has industrial connections should be as valuable and necessary as a clinical teacher of medicine who has hospital connections. Medical or nursing schools that give instruction in industrial health and safety, either as a part of their teaching of Preventive Medicine and Public Health or as a separate course, should cultivate the friendly cooperation of local industries in order to enhance their facilities for the field training of students. Moreover, a cooperative plan between local industries and a local medical or nursing school might even be the means of making available a joint arrangement for service and teaching in the medical or nursing aspects of industrial hygiene and safety which could not otherwise be supported as separate units.

Dust Diseases

—from the Management's Standpoint

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SILICOSIS has been recognized for many years under various names, such as potters' asthma, grinders' rot and miners' phthisis. It is now widely believed that silicosis is individually the most important and widespread of all specifically industrial diseases. A great deal of work has been done in connection with silicosis, particularly in South Africa, England, the United States and Canada. Unfortunately on this continent and more particularly in the United States, the matter has been left largely in the hands of the medical profession, and their efforts have in a large measure been confined to trying to determine the cause of silicosis. There is still no unanimity of opinion. With all of the research work that has been carried on throughout the world for many years, we still do not know the cause and we still have no cure. It sometimes seems to us that the interest of the employer has been subordinated to that of medical research, and that industry which has to pay the bills, is left more or less groping in the dark.

In the meantime this whole question has, in the United States, become the happy hunting ground of the lawyers and so-called medicolegal experts, with the result that in many places the question of silicosis and silicosis compensation has degenerated into a racket. I have found no disposition on the part of employers to try to escape their reasonable responsibilities, but they want to be sure that if they pay for disability it is a disability for which they are responsible.

In Ontario, miners' phthisis was added to the list of industrial diseases under the Compensation Act in 1917. The Silicosis Amendments to the Act were added in 1926, and these were again amended in 1933. We would probably have been a good deal better off financially if miners' phthisis had simply been retained as an industrial disease for purposes of compensation. However, as a result of the silicosis provisions in the Workmen's Compensation Act, we in Ontario have had more experience in the compensation of silicosis cases than any place on this continent.

The principle upon which practically all compensation acts are based is payment for impairment of working capacity. The principle of basing compensation on impairment of earning capacity has to a large extent been abandoned because so many factors such as age, general health and general industrial and employment conditions, may enter in and make it almost impossible to estimate compensation on impairment of earning capacity. Where the matter is simple, such as where the loss of a member occurs, little diffi-

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* Read before the Sixth Annual State-Wide Industrial Safety Conference, Durham, N.C., May 10, 1935.

culty arises, but when it comes to industrial diseases, and particularly silicosis, the basis of compensation is much more difficult, and should be determined on impairment of working capacity.

One of the chief reasons for the difficulty in rating for silicosis compensation is the failure of many doctors to differentiate between clinical or medical silicosis and compensable silicosis. These are not necessarily the same, just as injury is not necessarily disability.

Silicosis is a fibrosis of the lungs caused by the inhalation of silica dust. This fibrosis is not considered to be specific of silica dust until the lung section, if available for autopsy, would show palpable and visible nodules. In the x-ray plate this condition is shown by the appearance of nodules generally distributed over both lungs. This is known as first stage or anteprimary silicosis.

The diagnosis is dependent upon an x-ray picture. There may be few, if any, physical or clinical signs. There may be no evidence of impairment of working capacity and it is quite possible that the workman might be examined by a clinic of doctors who, without the x-ray, would be unable to say that there was anything wrong with him. In this stage, the diagnosis of silicosis is somewhat similar to the early diagnosis of lead poisoning which can only be determined by an examination of the blood. With this degree of either lead poisoning or silicosis there may be some injury, but there is not necessarily any disability if disability is interpreted as it should be for compensation purposes, that is, impairment of working capacity. We have the record of a number of men certified as silicotic who have continued for years and are still continuing in their former occupation with little evidence of progression and with no evidence of any failure in their capacity to work.

A man may have medical silicosis but he may not have a disability which entitles him to compensation. A man may have an injury which is not a disability and for which no compensation is paid. It seems to me important that in the consideration of this whole problem there should be a clear understanding of the difference between medical and compensable silicosis. The one is a pathological condition of the lungs evidenced by the appearance in the x-ray film and the other is or should be accompanied by a serious impairment of the capacity to work.

We are of the opinion that the diagnosis of silicosis in its early stages is more uncertain than many medical men are willing to admit. It is largely dependent upon the interpretation of an x-ray film and a good deal of what may be read into a film depends upon the technique in taking it. Other diseases and chest conditions may give in the film an appearance so closely simulating that of silicosis, that differentiation is almost impossible. Within the past few months we had two men classified as first-stage or anteprimary silicosis who were later found to be syphilitic, and when they were given treatment for the latter disease, their chest condition cleared up. It is safe to say that without a definite knowledge of occupational history the diagnosis of silicosis in its earlier stages is practically impossible, and even with this knowledge it is not always certain.

It should be realized that there are few normal adult chests. In the great majority of cases the x-ray pictures of adults who have had no exposure to dust in industry will show some scar tissue and general fibrosis. In many cases there will be a considerable development of general fibrosis, and we have instances of people, who have never been exposed to dust in industry, with what are apparently well developed cases of silicosis.

It is, therefore, important that if industry is to be asked to pay for disability as the result of silicosis, care should be taken to see that industry is not saddled with liability for which it is not responsible. As long as legislation confines the payment of compensation for silicosis to certain industries those industries require protection. The principle should be laid down that the purpose of the legislation is to provide compensation for cases of silicosis arising out of or in consequence of exposure to dust in these industries.

To ensure this a definite measure of protection should be given by the requirement for a minimum period of exposure. Both the English Act and the Ontario provisions relating to miners, provide that five years exposure in the scheduled occupation is necessary to establish a valid claim that the disease was contracted as the result of such occupation.

When it is considered that in South Africa and Ontario the average period of exposure for cases of anteprimary or first-stage silicosis is over 10 years, it will be seen that the five-year provision is not an unreasonable one.

There should also be some reasonable limit of time after a workman leaves an industry in which he was exposed to dangerous dust, within which he is entitled to establish a claim. The mere filing of a claim is not enough. He should be required to establish disability as the result of silicosis.

The English law covers this by providing that no compensation shall be payable unless the claimant establishes that he has silicosis in a compensable degree, within three years of having left the industry. The provisions of the Ontario Act are not quite as stringent.

It is generally recognized that silicosis is a progressive disease and predisposes a man to the development of tuberculosis. On this account industry cannot be wholly exempted from responsibility for its progression. There should, however, be some reasonable limit to this continuing liability. Once a man has been certified as silicotic there is a tendency to claim that any increased disability is attributable to the chest condition. Such increased disability may come as the result of advancing years or from other causes not connected with the claimant's silicosis. We find, however, that these conditions are laid at the door of silicosis, and because the doctors are often unable to say definitely whether or not silicosis is a contributing factor, the claimant usually gets the benefit of the doubt.

Another point to be considered is that once men leave an industry there is no control over them. They may engage in other occupations or expose themselves to conditions and even to infection, which will greatly accelerate progression. On this account we believe that even if a man has been certified as silicotic, there should be some reasonable limit after leaving the industry in which he was exposed, within which he can claim increased compensation as the result of progression.

I mentioned before that in our opinion at least,

there is a considerable element of uncertainty in the diagnosis of silicosis in its earlier stages. There is no sharp line of demarkation between pre-first-stage and first-stage or between pre-second stage and second-stage, and the interpretation of a film is to some extent a matter of personal opinion. There is also the fact that other diseases and chest conditions may give in the film an appearance so similar to silicosis that it is practically impossible to differentiate them.

On this account only the opinion of those doctors who have had special training and experience in the diagnosis of silicosis by both clinical and x-ray examinations, should be accepted. The opinion of the general practitioner and even of the roentgenologist and expert chest and lung man may be of little value. This matter is of such importance that the necessity for having really competent advice cannot be emphasized too strongly.

At this point I would like to refer again to the fact that medical silicosis is not necessarily compensable silicosis. Compensation should be payable only for working disability. Doctors are not always the best judges of what constitutes ability to work, and they are apt to interpret a pathological condition in terms of disability.

So far this discussion has been largely confined to the safeguards which are or should be provided by the law and by the medical profession if silicosis is made a compensable disease. Before proceeding to a discussion of the safeguards and preventive measures which are more under the control of the employer, there is one other phase of the situation with which I would like to deal.

The opinion is generally held that removal of the silicotic workman from exposure to dust will retard the progress of the disease, and that he should be removed. Theoretically this is true. In actual practice it does not necessarily follow.

If the silicotic workman is rehabilitated to some healthful occupation, where his standard of living is not lowered, where he is not worried about his future and if he is not worried about his physical condition, his resistance to further progression should be increased.

Generally however, the occupations where there is dust exposure are among the highest paid in industry. A man leaving one of these occupations may have to take lower pay. He may, on account of industrial conditions, be unable to get a job at all. His economic status will probably be lowered, and he may have to live under conditions which accelerate progression. In addition we find that certification as a silicotic produces a bad psychological effect. There is often a lowering of morale, with a consequent bad effect upon the man's physical condition.

These factors offset the benefits of removal and we have been forced to the opinion that there is little advantage to be gained in removing a known silicotic from his ordinary work, as an analysis of progression rates indicates little if any difference in favor of those removed. This may be due to the lowered economic status, but even if the economic status remained the same we doubt if removal would appreciably retard the rate of progression.

This statement is subject to two qualifications:

1. Every possible precaution should be taken to control the amount of dust, and silicotic workmen should not be allowed to work where the concentration of dust is high.

2. No silicotic workman with pulmonary tuberculosis, or where there is a definite suspicion of tuberculosis, should be allowed to work in dust exposure or in any position where he will be a menace to his fellow employees.

The further observation should be made that where periodic examinations are made and such examinations show a rapid development of fibrosis the workman should be removed from dust exposure before he reaches the silicotic stage.

Coming now to a consideration of those preventive measures which are more or less directly under the control of industry, we find that the following are the most effective in reducing the incidence of silicosis:

1. Improvement in working conditions by means of ventilation and the allaying of dust;

2. A rigid initial examination to keep out of the industry those men whose physical and chest conditions would indicate a type most susceptible to silicosis or tuberculosis;

3. Control of tuberculosis, not only among employees but also among those with whom they come in contact.

Ventilation and Allaying Dust

IF SILICOSIS is caused by dust the removal of dust will remove the cause. This means ventilation and plenty of it.

Because our experience has been almost entirely in connection with mines, and because your problems may be largely in connection with industrial undertakings, I shall deal briefly with the preventive measures that we take.

In mines the greatest source of dust is in blasting, and blasting should, therefore, only be done at the end of the shift, and sufficient time allowed for the air to clear of dust before the next shift goes on. A scientifically designed system of forced ventilation, with the control of air currents by means of doors and brattices is in the larger and deeper mines, essential and is desirable in all mines.

In addition to forced ventilation many mines use air and water sprays following blasting. The principle is the introduction of a small quantity of water into the air line which is blown through a small orifice, creating a fine spray which allays dust. Muck piles are also wet down and water sprays are also used at certain dusty ore passes and at various points in underground crusher stations.

In drilling operations, wet drills are used. The greatest amount of dust is created in collaring a hole, and a second water hose is sometimes used during this operation. Some mines now use the dustless fronthead type of drill, that is where the air does not pass down the hollow steel with the water.

Respirators have a restricted use. Machine crews use them when returning to reblast a face. They are quite extensively used by men working on crushers and in the pulverizing department of assay offices. A more efficient and comfortable respirator would be more generally adopted.

Water will allay dust to some extent, but it will not remove it. Inadequate ventilation may remove the visible dust from the air, but it is not the visible dust which causes the damage, but the fine

dust from one-half to five microns. The amount of dangerous dust in the air can only be determined by sampling and dust counting.

Where possible the control of dust should be in the hands of a competent engineer, who should have the necessary equipment to sample and determine the dust content of the air. We would consider it a mistake to have the type of equipment or permissible dust count defined by law. Our knowledge of the subject is still too limited for this. We do not yet know what constitutes harmful dust, and there is no standard practice for the treatment of samples.

Sampling is, however, important and necessary. It is recognized that neither the Impinger nor the Konimeter are accurate, but they will give comparative results which will be valuable guides to dust conditions and they will show whether the air is good, fair or poor. The type of apparatus best suited to your conditions which will give the best results with the least amount of trouble, should be used.

Initial and Periodic Examinations

NEXT to ventilation and the control of dust, the most important factor in reducing the incidence of silicosis is the selection of the men who are allowed to work in the industry. Silicosis is becoming such a problem, or such a problem is made of silicosis, that the physical standard of men allowed to work in dusty occupations must be raised.

The only control over this is by means of a complete physical and x-ray examination and the elimination of men with a type of chest which would indicate their susceptibility to the development of silicosis or tuberculosis. Men with bronchitis and asthma, men with any considerable development of general fibrosis and any considerable development of scar tissue, men with poor chest development and limited expansion, and men with the long narrow type of heart, should not be employed for positions where they will be exposed to dangerous dust. The exception to this would be healthy, well-developed men of 40 or over, with a number of years industrial history, even though they do show a considerable development of fibrosis.

The most rigid initial examination is probably in South Africa. There only a small percent of applicants are given certificates. The initial examinations were started in 1916, and the new men taken on since that time are known as the New Rand Miners.

A few months ago the chairman of the Miners' Phthisis Medical Bureau made the statement that among the New Rand Miners taken on during the preceding 10½ years no case of silicosis had yet developed. This experience is confirmed from Broken Hill, Australia, where there is a rigid initial examination and where ventilation is also stressed. One of the managers recently stated that no new case of silicosis had developed in the past 13 years. It should be noted, however, that at Broken Hill they do not have the periodic examinations.

It is, however, interesting to note that in South Africa even among miners who have passed the initial examination, the liability to contract silicosis, although not high, nevertheless has been found to be four times as great among those with previous mining experience as among those with no previous experience. This only serves to emphasize the necessity for care in the selection of men.

Tuberculosis

SILICOSIS, uncomplicated, is not a big problem, but it becomes one when complicated with tuberculosis. The situation is made worse by the fact that not only does silicosis predispose a man to tuberculosis, but tuberculosis will accelerate the development of the silicotic fibrosis. It is in fact the most active known agent in the development of fibrosis of the lungs.

Tuberculosis is not a compensable disease, but tuberculosis with any stage of silicosis, may be. There is, therefore, a tendency where any case of tuberculosis is found in a workman with industrial dust exposure, to assume that silicosis is a contributing factor. Once tuberculosis has developed it may be difficult, and at times impossible, to say whether or not the resulting fibrosis and nodulation is due to silicosis, but the workman is likely to get the benefit of the doubt.

The measures for the control of tuberculosis are too well known to need any comment, but control in industries where men are exposed to dangerous dust is essential. Particular care should be taken to see that men with tuberculosis are withdrawn from industry and given proper care and treatment. Places where employees live should also be supervised to see that they are not exposed to tubercular contacts.

Silicosis is essentially an employers' problem. In many places it is an important item in his cost of production and to a considerable degree is a controllable item of expense. If the employer considers it simply as a medical problem and does not himself take energetic and intelligent steps to control it he will have no one to blame but himself over what it costs.

Abstracts, Extracts and Reviews

PROF. PHILIP DRINKER says of Dr. George G. Davis' book No. 1: "Anyone specializing in any aspect of the silicosis problem will find the compilation extremely useful, but would welcome still more the promised future editions containing annotations on leading articles."

Dr. Davis announces, this month, his forthcoming Book No. 2—the first of the promised future editions.

Its title is "Review of the Pneumonokonioses (Silicosis)—Literature and Laws of 1934."

A sub-title might be: "International Abstracts, Extracts and Reviews of the 1934 Literature of the Pneumonokonioses and Their Allied Diseases."

The new second book carries forward, through 1934, the thorough source coverage of the first one, with the addition of the abstracts, extracts and reviews which are its distinguishing feature. Although the sources are international, the foreign language articles have been translated, so that the whole text of this second book is English.

Book No. 2 is composed of texts *plus* bibliography. Book No. 2 Brings the Library to the Reader.

Carbon Monoxide Poisoning

—A Modern Poison With an Historical Record Dating Back 25 Centuries—

by

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CARBON MONOXIDE is one of the most important poisons associated with human life and industry. It is out-distanced by only one other poison, grain alcohol. With the kindling of the first fire, man came in contact with carbon monoxide; and the effects of this most subtle of poisons were known in antiquity. Aristotle, nearly 300 years B. C., observed that "men suffer from heaviness of the head and often die from coal gas." L. Lewin[1], in his exhaustive monograph upon carbon monoxide, gives many instances of poisoning by this agency, showing that it had been a frequent cause of death by accident, by suicide, and as a means of punishment and torture. In 68 A. D., Seneca, after a number of attempts at suicide, finally "ended his life by breathing the vapor of burning charcoal." Hannibal (247-183 B. C.) put the inhabitants of Nuceria to death by "coal vapor." Since that time accidental deaths and suicides have markedly increased. Murder unaccompanied by suicide has been rare. Most of the deaths in recent years have been due largely to the more extended use of illuminating gas as a source of heat and power, also to the rapidly increasing use of the internal combustion engine whose exhaust always contains carbon monoxide. The number of deaths from illuminating gas, however, has been dropping in the last few years, owing to the more extended use of electricity as a means of illumination. (See Table 1.)

CARBON MONOXIDE when pure is nearly insoluble in water, colorless, tasteless, and a practically odorless gas, this latter physical property making it dangerous as a source of poisoning. The density compared to air is 0.967. It can be compressed into a liquid and a solid. It has a coefficient of solubility of 0.0243 at 15°C.

Carbon monoxide burns with a blue flame, two volumes of carbon monoxide uniting with one volume of oxygen to form two volumes of carbon dioxide.

$$\underset{\text{2 vol.}}{CO} + \underset{\text{1 vol.}}{O} = \underset{\text{2 vol.}}{CO_2}$$

Under the ultraviolet rays carbon monoxide becomes formic acid. The alkaline hydroxides change it to the formates.

$$CO + KOH = HCO_2K$$

CO unites with Cl forming phosgene, which was used as a toxic war gas, and has also caused industrial poisonings.

Carbon monoxide is produced at the electrodes or from the charges of electric furnaces. In electric furnaces having limestone linings the carbon dioxide is reduced to carbon monoxide at the heated electrodes; the gas escapes unburned, producing characteristic symptoms. The most common sources of carbon monoxide, with the exception of its marked formation during a severe lightning storm, are stoves, grates, salamanders, domestic and industrial furnaces, distillation of oil, gas engines, fumes from explosions, burning x-ray films, smouldering ashes, and mine, coal, natural and artificial gases. It is formed whenever incomplete combustion of carbon occurs, such as flames on besooted surfaces and low burning oil lamps. Using an intermittent aspirator to imitate the smoking of tobacco, I found that the carbon monoxide from the inhaled smoke from cigarettes was from .01% to .26% of the tobacco and paper consumed, from cigars .027% to .15%, and from pipe tobacco, .027%.

Enormous quantities of carbon monoxide are daily produced in the manufacture of illuminating gas, producer gas and water gas. In the city of Chicago during 1930 there were 3,724 miles of pipe used for the transportation of 110,000,000 cubic feet of gas per day, having the average composition of 2.5 to 3% carbon monoxide. The proportion of carbon monoxide differs greatly in domestic and industrial gases, varying between 4% and 30%. In coal gas there is from 4% to 10%; in water gas 30%; and from 20% to 30% in producer gas. The exhaust of an automobile may have from 1.5% to 6.5% of carbon monoxide.

The greatest percentage of carbon monoxide asphyxiation is through the medium of illuminating gas, which has the characteristic odor of the hydrocarbons accompanying the gas. This familiar odor does not prevent many accidental poisonings, as the odor may not be perceived by those in deep sleep, or by a person with a defective sense of smell.

It is commonly believed that during the winter months the percentage of carbon monoxide in the illuminating gas increases and that is the chief reason for more deaths from gas poisoning. The percentage of carbon monoxide, however, does not increase during the winter months. Table 2 gives the number of deaths from gas asphyxiation for each month for one year, and the percentage of carbon monoxide. With the present plan of using the natural gas (which does not contain carbon monoxide) mixed with coke oven gas, the danger of carbon monoxide will be greatly increased unless some tracer gas is added to warn the public when it escapes. The danger of explosion is also increased with the proposed gas mixture. The more extended use of gas in homes, during the winter, the closed doors and windows preventing proper ventilation if there are leaky pipes or loose connections, accounts for the increased number of gas asphyxiations. All gas stoves, plates and heaters should be connected by metal instead of rubber.

From the records of death from carbon monoxide poisonings during 1918 and 1919, while I was in the Coroner's office of Cook County, I found 52 causes for deaths from the inhalation of the gas. The chief one of these was the open jet; next, the open burner of the gas plate or range, and third, the boiling water from a vessel putting out the flame.

1. Die Kohlenoxydvergiftung, p. 3, 1920.

Carbon monoxide may be freely respired, its presence in air not being manifested by either irritation to the air passages or by affecting the sense of smell as is noted with sulphur dioxide, a gas used in mechanical refrigeration. However, the moment carbon monoxide comes in contact with the blood by diffusion, it unites with the red pigment of the blood corpuscles, forming a definite compound, carbon monoxide hemoglobin exactly replacing the oxygen volume for volume. According to the research of Nicloux[2], one volume of carbon monoxide acts like 220 volumes of oxygen. The corpuscles are not dead. All that is needed is oxygen under sufficient tension to displace the carbon monoxide. Hill and Barcroft have shown that carbon monoxide enters into combination more readily when a little oxygen is present than when it is completely absent. In Barcroft's experiments with carbon monoxide poisoning, he found that an animal at rest could breathe an atmosphere containing a low percentage of CO and yet the hemoglobin in the spleen pulp remains perfectly free from the gas, although the blood in general circulation reaches a 20% saturation. It is evident that during this period the blood must pass from the arteries to the veins by some other route than through the pulp. During exercise, on the other hand, the hemoglobin of the pulp became charged with CO in the space of five minutes. The spleen, therefore, appears to be a place where a reserve of red corpuscles may be stored until some emergency arises demanding an increased oxygen transportation.

DEATH by carbon monoxide is so common, and so much has been written upon it from a toxicological standpoint, that we have neglected to study and report in the literature what happens afterward in these people who survive severe or mild intoxications.

Haldane believes that all the effects of carbon monoxide can be referred to lack of oxygen, the symptoms increasing with the saturation of the blood. Mice were kept alive on exposure to 200 to 300 times the fatal dose of carbon monoxide in the presence of oxygen under one or two atmospheres of pressure. Haggard[3] maintains that there is no direct toxic action of carbon monoxide on the heart; for if respiratory failure is prevented by means of administration of 8% to 10% carbon dioxide, the CO combination with the hemoglobin may rise to an unusually high per cent without any evidence of impairment of the heart function. Death in cases of carbon monoxide asphyxia is due to the failure of respiration of the nature of a fatal apnea vera. Haggard further states that the lack of oxygen resulting from the formation of CO hemoglobin induces excessive breathing which in turn results in an abnormal loss of carbon dioxide followed by failure of respiration. The increasing anoxemia from this cause speedily results in the development of heart block through its various stages.

Regardless of what may be the belief as to the nature of CO poisoning, whether CO causes only a simple asphyxia or as a toxic agent, it is well recognized that where carbon monoxide has been inhaled for a considerable time, the damage done to the nervous tissue, especially the vital nerve centers, is very serious. Some observers declare that carbon monoxide exercises a specific action upon the central nervous system through the circulating blood. Carbon monoxide apparently exerts a specific action upon the nervous mechanism of the heart which has been attributed to its specificity for the nerve centers.

Drinker[4] reported a case of Parkinsonism, occurring in a woman 58 years of age who was found unconscious in a gas filled room. The patient regained consciousness after a few hours in a hospital; recovery was complete with no motor disturbances. Six months later orientation gradually became poor, she became apathetic and did not speak. She was sent to a hospital for mental disease. The patient gradually became worse; death occurred with a pulmonary edema. There were seen grossly in the coronal section of the brain yellow-brown, necrotic areas in the pallida.

McGurn[5] mentions more than 100 neurological and symptomatological conditions, as well as two cases of a syndrome not unlike that of multiple sclerosis.

The work of Hill and Semerak upon the brain emphasized the relation between carbon monoxide poisoning and the subsequent development of nervous and mental disease. From the examination of 32 brains they came to the conclusion that the damage to the lenticular nucleus depends upon the age of the patient, the degeneration of the vascular system, pre-existing disease of the brain, duration of life after the accident, and the amount of gas inhaled. Briand says that loss of memory is common as a result of CO poisoning. It is not slow and progressive as in alcoholic dementia, but comes on suddenly.

Oliver reports blast furnace men who developed incomplete loss of power in the limbs and later an affection of speech after the acute symptoms had disappeared.

DIAGNOSIS: The diagnosis of carbon monoxide is often very easy, sometimes difficult, and never positive unless a chemical examination of the blood has been made. The symptoms may simulate many other conditions. The reason for this is chiefly in the rate of absorption and the extent of the combination of the hemoglobin with the gas. When the volume of breathing is increased by muscular exertion, the absorption of gas is proportionally increased. The smaller or younger the individual, the quicker the saturation of the blood by carbon monoxide. In the resting stage the volume of breathing varies between individuals as a function of the surface area of their bodies. Small individuals succumb to carbon monoxide more rapidly than large individuals, for the volume of their respiration is greater in relation to the volume of their blood. This fact is made of practical use in the examination of the air of mines, when mice or canaries are carried into the vitiated air as living signals of dangerous amounts of gas. Men breathing the same atmosphere have about 20 times as long a stay in the contaminated air as the small animals before getting into a like condition, as men have one-twentieth the skin surface of the small animal per unit of body weight.

Litten found glycosuria in 70% of cases of car-

2. *Presse med.*, 1916, 25, 153; Ibid, 1921, 29, 701.
3. Studies in Carbon Monoxide Asphyxia: 1. The Behavior of the Heart, *Am. J. Physiol.*, 1921, 56, 390-403.
4. Drinker, R. R., *J. Nerv. & Ment. Dis.*, 64, 18, 1926.
5. *Med. Rec.*, XCI, 149, 1917.

bon monoxide. While the glycosuria may last three or four days, it generally disappears before the end of the second day and it, therefore, is frequently missed, as urine examinations are not made until 24 to 48 hours afterward. This glycosuria may be indirectly due to the anoxemia.

The onset of symptoms may be sudden, but usually there are warning sensations, as headache, throbbing of the temples, ringing in the ears, faintness, dizziness and vomiting. The face becomes red, and there is loss of memory, vertigo, fainting, anesthesia and loss of all spontaneous power of movement. The heart action is at first violent, then weak, slow and arrested. The body temperature is lowered. Recovery is sometimes rapid. As a rule, however, there is a slow return to consciousness, with more or less prolonged headache, nausea and weakness. When the gas itself does not kill, apoplexy or softening of the brain may follow.

convulsions, some are in coma, a few have delirium and 70% have glycosuria, a faulty diagnosis cannot always be criticized.

Chronic poisoning by carbon monoxide has received the attention of many observers in recent years. There is very good evidence of this form. Accumulated cases show that it is the result of being in a constantly contaminated atmosphere. The symptoms are described as an alteration in the digestion, diminished vigor, gray color of the skin, coated tongue, loss of memory, diminution of the psychic powers and occasional convulsions. The pathologic findings of autopsies have shown in some fatty degeneration; in others, pernicious anemia.

Haines, Karasek, and Apfelbach, in their investigations of the effects of carbon monoxide, have found that workmen exposed frequently to the gas in metallurgical establishments in a large majority of cases developed a considerable increase

1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934
470	479	518	386	237	214	361	412	320	403	375	398	237	310	304	188	128	143

Table 1. Deaths due to Carbon Monoxide Poisoning in Cook County, Illinois

According to Becker and Schwerin, the sequelae divide themselves into four groups: (1) Primary gangrene with blisters and decubitus; (2) primary hemorrhages, as of the lungs, apoplexy and the like; (3) a persistent distention of the capillaries and other vessels in which the symptoms are shown in the skin, red nose, red spots not unlike those caused by frostbite; (4) a deep-seated disturbance of the regeneration of all organs, especially of the vascular walls and the ganglion cells of the nervous system evidenced by secondary hemorrhages, idiocy, imbecility, chorea,

of red corpuscles above the normal, the number in one case examined reaching 9,000,000. The amount of hemoglobin was also usually above normal. These investigators attribute the increase in red cells and hemoglobin to a protective effort on the part of the system. Roth[6] found in five cases a marked leukocytosis with an increased erythrocyte count.

TREATMENT: This consists in taking the person at once out of the poisonous atmosphere into fresh air, and inducing artificial respiration

	Percentage of Carbon Monoxide	Water Heaters	Accidental	Undetermined	Suicides	Homicides	Total
1916							
January	23.9	1	16	9	23	5	54
February	26.4	1	13	7	13	0	34
March	24.1	0	18	7	21	0	46
April	23.9	0	19	8	19	0	36
May	27.2	2	14	8	23	0	47
June	26.2	2	11	2	12	4	31
July	23.0	0	5	12	20	4	41
August	24.2	0	5	4	12	0	21
September	22.4	0	13	8	26	3	50
October	22.6	0	23	9	17	1	50
November	29.1	0	7	5	20	0	32
December	31.0	0	14	6	13	2	35

Table 2. Deaths from Gas Asphyxiation and Percentage of Carbon Monoxide

ascending paralysis, etc. Evidence of injury to the lungs is noted in a number of victims of gassing who have an excess of fluid in the respiratory tract, frothing at the mouth, in the early stages, and the appearance of rales in the lungs and later bronchopneumonia.

In the acute stage a diagnosis of food poisoning, strychnine poisoning, diabetes and alcoholism have been made in cases of carbon monoxide poisoning. In fact, the symptoms are so varied that a physician is reminded of diseases of the brain, spinal cord, lungs, kidneys, liver and skin. As many cases have persistent vomiting, a few have

as rapidly as possible; the giving of oxygen under slight pressure, enough to distend the cheeks, and then compressing the lungs, is considered one of the most, if not the most, efficient method of restoring the person to life. The elimination can be hastened by the inhalation of oxygen and 5% carbon dioxide. Drinker and Shaughnessy[7] recommend the use of 7% carbon dioxide and 93% oxygen for the first five to 20 minutes. Henderson[8] reports that with dogs oxygen plus carbon diox-

6. *Deutsche Ztschr. f. d. ges. gerichtl. Med.*, 14, 1929, 30.
7. Drinker, C. K., and Shaughnessy, T. J., *J. Indust. Hyg.*, 11, 301, 1929.
8. Henderson, Y., *Brit. M. J.*, 1, 41, 1926.

ide the carbon monoxide hemoglobin is reduced below 10% in 20 minutes, while with inhalation of air it takes 140 minutes to accomplish the same result.

DETECTION: The period of time during which the presence of carbon monoxide may be detected in the blood does not depend alone upon the duration of the period of exposure or its intensity, but upon individual peculiarities as well. In most cases, however, the length of time during which carbon monoxide may be detected depends largely upon the period of exposure, and the time the patient has been removed from the contaminated atmosphere. Out of 43 consecutive cases received at the Cook County Hospital of Chicago, 34% were examined within one-half hour from the time the patient was removed from the source of exposure, carbon monoxide being found in all of these; in 30% the exact time was not known, but was greater than one-half hour, 27% being positive and 3% negative. Twenty to 40 minutes

Cause	1918	1919
1. Open jet, cause of its being open unknown	86	133
2. Open burner of gas plate or range	49	44
3. Open burner of range, vessel boiling over	24	20
4. Deceased intoxicated	19	
5. Disconnected hose	17	29
6. Defective fixture	14	5
7. Lighted gas fixture	10	6
8. Coal stove gas	8	1
9. Hot water heater	7	11
10. Gas heater	6	6
11. Defective rubber hose	5	14
12. Automobile motor running in closed garage	5	2
13. Clothing hanging on fixture	5	
14. Wind blew light out	4	3
15. Coke gas from furnace	4	3
16. Disconnected pipe	4	2
17. Broken supply line	4	1
18. Gas frozen	4	1

Table 3. Causes of Death from Inhalation of Carbon Monoxide

elapsed in 14%—12% gave positive tests and 2% negative; 10% were examined in three hours, all being positive; in another 10% five hours elapsed; all were positive and in 2%, 12 hours passed and all gave positive tests.

In the cadaver, carbon monoxide may be found in the blood for weeks after death if the body has been preserved by cold; however, if the body has been in a warm place for a few days, tests may fail to show the presence of carbon monoxide hemoglobin. In embalmed bodies I have found the carbon monoxide hemoglobin nearly a year afterward.

Blood taken from persons poisoned by carbon monoxide shows a characteristic absorption spectrum closely resembling that of oxyhemoglobin. The absorption occurs between D and E lines chiefly, and is apparent through the appearance of two absorption bands of nearly equal intensity and width. There are several precipitation tests which can be made in the office without any elaborate apparatus. Blood rich in carbon monoxide when boiled yields a brick red mass; ordinary blood becomes brown-black. Ten cubic centimeters of 2% solution of a blood strongly charged with carbon monoxide with 2 cc. of yellow ammonium sulphid and 2 cc. of 30% acetic acid yields a bright red, while normal blood yields a green precipitate. When blood is added to diluted hydrogen sulphid water drop by drop, it produces a bright red precipitate when carbon monoxide is present, otherwise a bright green. Normal blood when shaken with one or two volumes of a solution of sodium hydroxid of 1.3 specific gravity becomes black, in thin layers dark greenish brown; carbon monoxide blood remains red and appears like red lead or cinnabar. Blood diluted one part to four with water and shaken with three times its volume of a 1% tannin solution becomes in 24 hours a gray tint when normal, but is carmin-red when carbon monoxide is present. A much quicker test is the pyrotannic acid test. Take one-tenth cc. of blood; add 2 cc. of water and .04 gram of equal parts of tannic acid and pyrogallic acid; normal blood is gray and carbon monoxide blood carmin-red. A blank test should be run with normal blood for comparison. The unknown can be compared with standard tubes as in the slide. A quantitative determination of the carbon monoxide is more complicated.

POSTMORTEM: Sudden death by carbon monoxide may produce very few changes, or if the patient lives for a short time after exposure, only a careful examination of the blood will reveal the presence of the gas. Where the blood is well saturated with the gas, the surface of the body is cherry-red. The dependent parts at the surface of the body are deeper red than other parts. The most characteristic change is the bright cherry-red blood, usually fluid and coagulating slowly, present in the arteries, veins and all of the tissues. When death occurs rapidly from cyanid poisoning, the blood is also bright red, but the color is not as permanent as in gas poisoning. If the gas poisoning be prolonged, small hemorrhages are present in the pleural cavities, with pulmonary edema and bright red froth in the air passages. Small punctiform hemorrhages may be found in the gastric and intestinal mucosa, great omentum and in the

Per cent of hemoglobin in combination with carbon monoxide	Physiological effect
10	No appreciable effect except shortness of breath on vigorous muscular exertion.
20	No appreciable effect in most cases except short wind even on moderate exertion; slight headache in some cases.
30	Decided headache; irritable; easily fatigued; judgment disturbed.
40-50	Headache, confusion, collapse and fainting on exertion.
60-70	Unconsciousness; respiratory failure and death if exposure is long continued.
80	Rapidly fatal.
Over 80	Immediately fatal.

Table 4. Percentage Saturation of the Blood with Carbon Monoxide and Corresponding Physiological Effects

leptomeninges under conditions difficult to explain except under carbon monoxide. As previously mentioned a very characteristic change in prolonged carbon monoxide poisoning is the occurrence of punctiform hemorrhages and softening in cortex and central nuclei of the brain, notably with two internal segments of the lenticular nucleus. Where life has been prolonged the skin may show herpes, blebs and pemphigus followed by gangrene. The kidneys may show fatty degeneration and necrosis in the convoluted tubules.

CARBON MONOXIDE and Private Garages: The number of deaths caused by inhalation of carbon monoxide from automobile exhausts in closed garages is increasing. In six years I collected 63 deaths. Every day during the winter months the lay press contains references to deaths in garages in some part of the country. As the average composition of the exhaust gas by volume is 6.03%, only a few minutes is required to obtain a toxic dose. Yant, Jacobs and Berger give the percentages of carbon monoxide in the air of a closed garage of 2,950 cubic feet capacity in which a five passenger car was running at 200 revolutions per minute. In 25 minutes the air contained 1.31%; in 60 minutes, 2.10%. An analysis of crank case gas gave 0.9% carbon monoxide with the motor racing; 1.4%, or 140 parts per 10,000 of air, with the motor idling. This gas coming into the closed body of a car could easily account for many of the unexplained headaches of our patients who drive with inadequate ventilation.

No. 1	From crank case, motor racing.			
	Carbon monoxide	0.9%	or 90	parts per 10,000 air
	Carbon dioxide	2.9%	or 290	parts per 10,000 air
	Oxygen	16.5%	or 1650	parts per 10,000 air
No. 2	From crank case, motor idling.			
	Carbon monoxide	1.4%	or 140	parts per 10,000 air
	Carbon dioxide	4.0%	or 400	parts per 10,000 air
	Oxygen	15.1%	or 1510	parts per 10,000 air
No. 3	From exhaust, no dilution.			
	Carbon monoxide	4.0%	or 400	parts per 10,000 air
	Carbon dioxide	12.1%		
	Oxygen	0.2%		

Table 5. Crank Case Gas Analysis

Public garages are more of a menace to the workers in the garages than to the public. Krankenberg reported, in 31 different garages, that in 69.5% of the workmen who submitted to the blood test, carbon monoxide was found. The concentration of carbon monoxide in the air of city streets other than automobile boulevards is insufficient to constitute a serious public health hazard. In Chicago the Health Department reports "at times the air of automobile boulevards contains enough carbon monoxide to menace the health of those exposed over a period of several hours, particularly if their activities require deep and rapid breathing."

Death from carbon monoxide in private garages is absolutely preventable, if the poisonous gases from the exhaust are conducted to the outside air by means of a pipe or hose in the door to which the automobile exhaust can be attached. In the absence of this arrangement the large door of every garage should be left open so that the exhaust gases can be discharged directly into the outside air. If our patients could be educated to ventilate their homes by opening the doors and windows when they first smell gas, many of the deaths listed in Table 3 could be eliminated.

Silicosis and Tuberculosis

GARDNER* points out that at least 75% of human beings who develop silicosis die of tuberculosis, which may make its appearance at any stage of the disease. The infection may already exist in a latent form when the individual takes up his occupation in the dusty industry, or it may be acquired subsequently. In some instances it may not become manifest until years after the exposure to dust has ceased. Animal experiments have demonstrated that partially healed primary foci of tuberculosis may be reactivated and rendered progressive by inhalation of silica. Serial roentgenograms of human beings exposed to silica have demonstrated reactivation of latent apical tuberculosis in the same manner. It seems probable that, if lesions contain living tubercle bacilli, the dust will ultimately cause the lesions to become progressive. In the silicotic experimental animal, subsequent infection with attenuated tubercle bacilli tends to produce a rapid type of disease, which terminates fatally within three or four months. The nonsilicotic controls practically never die of such infections. When the practice of employing in silica industries only men whose chest roentgenograms are normal has been in force for some years, the relationship between silicosis and the complicating infection should become more clearly defined. In the roentgenogram of silicosis complicated by early tuberculosis, the alteration in the character of the nodules is manifested by a peculiar fluffiness and haziness of their outlines. Furthermore, at some point in the lung the characteristic uniformity of distribution is interrupted and there is a marked tendency to aggregation of the nodules. When the process is far advanced the localized, massive, leathery fibrosis casts dense shadows with ill-defined radiating borders. Often such changes are symmetrically located in the subclavicular or middle portions of both lungs. The combination of silicosis and tuberculosis is a new condition and not merely a combination or a superimposition of one process on the other. The combined disease sometimes progresses rapidly and terminates fatally within a few months; at other times it is chronic.

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* *American Review of Tuebrculosis*, 29: 1 (January) 1934. Abstr. *J.A.M.A.* May 5, 1934.

The Medical Department Manual

—The Complete Handbook of Organization, Operation and Routines Representing Actual Experience and Practice of 20 Years—

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VIII. Forms *(April,* 1934).
IX. General Instructions to Examining Surgeons;
X. Classifications of Physical Defects;
XI. Classifications for the Reviewing Surgeon *(May,* 1934).
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XIII. Interpretation of Physical Defects of Employees for Department Executives *(June,* 1934).
XIV. Requirements of a Course in Industrial Medicine and Surgery (*February,* 1935).
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XVIII. How the Medical Department Can Be a Factor in the Reduction of Absenteeism.
XIX. Industrial Medicine and Surgery; Its Past and Present Status.

Section XVIII

How the Medical Department Can Be a Factor in the Reduction of Absenteeism from Work

WHEN the average person anticipates making a purchase of any commodity, he has in mind what it is for, its quality, and if it is worth the price asked. It is true that many times the purchase of a commodity is pure guesswork, but the average customer, after a careful selection of the article, pays a fair price and gets value received. It is the careless, impulsive buyer who selects without discrimination, who later finds cause for complaint that his purchase was unsatisfactory.

The same is true when it comes to employing men and women for work in a given industry; it is just as essential that the employer have in mind definite facts that will guide him in the selection of a person capable of doing, efficiently and safely, the work the position calls for. If from those who apply for a position you select one from external appearance you do not know what the interior shows. He may be capable of performing the work at hand, but do you know whether or not he will be able to stand up physically on the job? This can only be determined by a careful physical examination before he is taken into your service. The examination should be made before hiring him, and not after he has been employed and broken in to the duties of his job and to his environment.

To be of any value, the examination must be of a definite sort and of sufficient thoroughness to discover any defect or insidious disease. The few-minute medical inspection means nothing; it is valueless, is money and time wasted. The examination should be made under a standard set of physical requirements for each position in the industry. And these physical requirements should be arrived at by an analysis of each *job's* requirements, hazards, and environment. When the examination has been made, you then know to a great degree just what are the physical or staying qualities of your purchase, the new employee. You have not selected blindly; you have fitted him into the position for which he is best suited, and which he can discharge efficiently and with safety to himself and to those about him.

This is the first place where the Medical Department can reduce the causes of absenteeism from work on account of either illness or injury. Having a fairly healthy employee in the beginning, you have a known quantity; he will not be so apt to be absent from his work as the result of sickness. The examination detects those conditions that make for illness and are potential factors in accident causation. The defective eyesight, hearing or color sense all predispose to illness and accident, and if these are undetected in a new employee, does it not stand to reason that sooner or later they will result in conditions that will cause him or others about him to be absent from work on account of an illness, an accident, or an injury?

Employees who have ruptures, defective hearts, defective limbs due to crippling, or such defects as flat feet, varicose veins, etc., are great offenders when it comes to absenteeism from work. Defective teeth and tonsils, by causing complications productive of more serious diseases, play their share in absenteeism. It is better that these conditions be detected and remedied before employment, as otherwise they remain undetected after employment until their owner becomes a chronic offender.

It is inevitably the undetected, trivial, physical condition which, if given time in which to progress, will at a later date, after employment, bring the employee's name on the daily list of those absent on account of illness.

As to injuries caused by undetected physical deformities, many times the defect is such that the employee fails in certain work that is being performed, and an accident is at hand. This is best evidenced by the workman with a hernia who is engaged in lifting heavy objects. He drops his end on account of sudden pain due to the rupture, and his feet or his fellow worker's suffer.

PHYSICAL examination reduces absenteeism from work in proportion to the thoroughness with which the examination is made.

After you have employed a healthy man, of known physical make-up, it is next essential that he be maintained in that condition so far as possible, either by compulsory examination on his own initiative, or, better still, on the company's, as the man is very prone to neglect trivial symptoms and put off to a future date having his examination made and his necessary treatment started. A physical medical survey detects physical conditions that arise following employment.

Many industries examine all new employees carefully but stop the health policy after the man is employed. What a mistake that is!

After your employee has been broken in on the job and is functioning as a part of your organization, any illness or injury then developing will bring greater loss economically to both him and yourself. *It costs money to educate a new employee.* And then, too, absenteeism from his bench on account of either injury or illness will in many cases disrupt the orderly routine of your industry. You maintain your machinery and tools in a safe and efficient manner. Why isn't it more important that you maintain in a healthy state the men who use the machinery and tools? Periodical medical examinations of employees have proved a definite factor in the reduction of absenteeism from work.

If the employee is in a good state of health, he is not so prone to respiratory infections which are the greatest cause of illness away from the job. If he is in a good healthy state at the time of injury, he will be returned to his bench in a shorter time and with fewer disabling complications than if he was not physically fit. For example, the man with a mouth filled with diseased tonsils and teeth is off frequently with rheumatism, lumbago, indigestion, etc., from focal infection, and when he is so unfortunate as to have some simple injury, you find his complications developing and his disability extending over a long period of time. This is so often seen in the case of back injury developing from a trivial accident; on account of pre-existing disease elements the condition is aggravated, the deformity is more serious, and convalescence is delayed. Proper periodical and thorough physical examinations will reduce absenteeism caused by illness and injury.

These two procedures are known as industrial prophylaxis of disease, if you please, and come under the heading of prevention of absenteeism from work on account of illness and injury.

NOW there is another group of conditions in industry that aids in the reduction of absenteeism on account of illness and injury. The well organized Medical Department of any industry can effect great service and save a vast amount of money for the company by a systematic routine of handling injuries and illnesses that are prevalent in any locality or industry. Where a large group of like medical and surgical conditions are taken care of by an organized group of doctors, greater experience and education in the most efficient manner of treatment are to be had. Many injured employees are kept away from the job by reason of prolonged and inefficient treatment by doctors who see few if any of the various conditions which are common in industry. Experience has shown that injured cases return to work earlier when treated in the industrial Medical Department, where competent medical authority is available, than when they are treated elsewhere. Many times they are fitted in the organization in a capacity where they have an income and at the same time perform work that their injuries will permit without harmful effect.

A man whose mind is occupied with engaging work will recover more quickly than one who is idle and allowed to be alone with his thoughts. A little patience on the part of the industrial medical man and cooperation from the department heads will fit this worker in, and will reduce his absenteeism from the job on account of illness.

How much verbiage has been expended by both the medical man and the layman in industry toward remedying absenteeism from work on account of illness, but how little real action has been inaugurated. By trying out a definite medical policy in an orderly, systematic manner, results will be produced. In illness, especially the common cold, a great reduction in the number of employees forced to stay away from work can be made if medical supervision is had at once when the first sneeze is heard or the first drop appears on the nose. A day at home away from the job will prevent contaminating others in close proximity to the afflicted one, and the day's rest under therapy will return the employee to his bench sooner than if he is allowed to follow his own dictates and drag his cold out three or more days—with poor output and an inferior grade of work, only later to stay at home with a more defined respiratory case.

What is needed in industry is courage to follow out experimentally some of the real established health factors for a definite time, and compare cases of neglect where no treatment is given; it will soon be seen that there is a definite value returned in proportion to the medical effort put forth. Sanity is essential in this medical work, and one must not by his policy disrupt the orderly functioning of a given industry. Where the medical authority bewails absenteeism from work and his helplessness to check the same without disrupting the practical processes of his industry, he has not started at the bottom of the absenteeism defect ladder, but is at the top, trying to remedy conditions which can only be reached from each individual step of the ladder from the ground up.

Many times I hear Medical Department chiefs say that when an employee presents himself at their offices complaining of feeling ill, their duty consists in signing a card for the department official stating that the employee is sick and should be excused from work.

What a sad spectacle: a doctor doing this simple, clerical procedure instead of using the professional qualities he possesses, making a careful examination of the patient, and giving a written statement of the treatment he is to follow while at home—for the greater proportion will go home, try home remedies and get advice from other sources instead of seeking their medical adviser, until the disease has a full hold on them and they are frightened. Only then will they seek competent treatment. But if the medical chief can interest himself in the individual enough to ex-

amine and supervise treatment and then check up the case, he will soon show his value in dollars to the executives of his company by a lowered absenteeism rate.

NOW for one of the causes of frequent absenteeism from work on account of illness, that is so prevalent in industry: the sick and health benefits that are so often of a size in dollars that it pays an employee to be sick, as he will derive more money by staying away from the job than if he works. Benefits are often received from one or more companies, and the employee stays at home for trivial injuries and illness, and many times for no bona fide cause, when he should be at work. It is very easy for employees to secure a doctor's certificate of alleged illness and injury for a few dollars; but if the Medical Department will supervise the investigation of every claim and check up the doctor and the claimant from its office, a great reduction in the rate of absenteeism will result and many dollars will be saved to the companies and the employees' mutual benefit associations. Do not understand me to say that all employees are susceptible to this practice; but in any large organization employing large numbers of men, such employees are in sufficient numbers to bring up the absenteeism rate. In so many of the benefit companies, the doctor is so submerged under the red tape of the so-called welfare department that his value is lost and his efforts only clerical.

THE Medical Department has definite work in the sanitation system of every industry. A healthful working environment is conducive to a healthy personnel and assures a minimum of absenteeism from work on the part of the personnel. Proper illumination of a plant forestalls nervous and mental conditions, as eye-strain is conducive to these defects when the working space is dimly lighted or where glare is present. Proper ventilation and heating are essential in every plant if the absenteeism rate is to be kept at the lowest point. Gases, smoke, fumes and lack of fresh air are the handmaidens of disease germs, and underheated or overheated rooms are the direct cause of many diseases which are disabling. The absenteeism rate mounts with the neglect of these essential features of good health. The Medical Department, by supervising the sanitation system of an industry, is able to lend important aid in health conservation. Analysis of the different greases, compounds, solutions, paints, chemicals, etc., is a necessary duty of the medical department if it is to prevent industrial diseases. Published articles and talks on health subjects to employees of the company, at not too frequent intervals and in common sense language, are important factors in reducing the rate of absenteeism from work.

INSTRUCTION of employees in first aid work in the absence of medical attention in time of illness or accident has not only conserved human life by immediate assistance, but has also been the stimulus to directing the attention of the employee to his own personal self, and of inciting him to look after his own health and well-being. First aid has reduced absenteeism from work, as timely attention to trivial injuries has prevented prolonged disability. Proper first aid reduces complications, such as infections following simple injuries. To be of service, first aid must be taught correctly and closely followed up afterwards.

A visiting nurse policy has its advantages in helping to reduce the absenteeism rate. The nurse calls on the ill or injured employee within a few hours after his absence is reported, and she is very often able to bring aid to the employee. Her ministrations in time of illness not only save the employee expense, but also hasten his recovery. The money spent in this nurse work is returnable in a large measure in the morale of the employee body.

WHEN department or supervisory heads become aware of an employee slowing down, either in his production rate or the quality of his products, then it is the time to determine the cause of the letdown. Should an employee attract the attention of his fellow workers by peculiar or unusual actions, the Medical Department should be called in. A careful examination will reveal physical defects or a mental crisis, and if attention is given to them at this time it will prevent prolonged absenteeism later.

More attention should be given to experimental work by the Medical Department as to the mental causes of accidents and the resultant absence from work. This is a very important factor in industry today. Many employees have accidents for which there seems to be no apparent excuse and the authorities are at a loss to understand the cause. These occurrences always carry with them a greater period of absenteeism from work than ordinary accidents, as many times there is a mental defect to overcome in addition to the physical defect. Greater interest on the part of plant executives in the study of the individual, instead of mass study, and employing competent medical men to aid in the work will help to decrease the absenteeism rate.

While on the mental side of absenteeism from work, it is necessary that a few words be said relative to women in industry who so often are the greater offenders when it comes to being absent from work. Very often insufficient periods of relaxation are the cause of fatigue of the woman employee. On account of the average physical make-up of the woman and the fact that many times she is called upon to perform work the nature of which is beyond her physical and mental capacity, she functions for a time on her reserve vitality and nerve. But one day this weakens, and she becomes a prey to the many disabling conditions that women are susceptible to. The Medical Department, with efforts rightly directed in this channel, can reduce her rate of absenteeism. Women-in-industry is a problem in itself, but progress is being made medically toward improving her condition.

The point of greatest importance in industry today is to have each industry establish a set medical policy for its employees and then organize a Medical Department with a personnel whose interest is in the industry which employs them and whose ambition is to produce such a state of health in that industry as will command the attention and respect of all other industries. The efforts of the Medical Department, rightfully di-

rected and competently manned, will be a direct agency for the reduction of absenteeism from work in industry. Again I make the plea that more actual experiment be inaugurated and less talking done as to this problem. It costs money for anything of value, be it service or product, and if only the interest on the economic loss due to absenteeism from work was applied to real active prevention, great headway would be made. Industrial medicine is in its infancy today, but it is here to remain, nevertheless, and as time goes on the Medical Department in industry will have the same reputable standing before the world as do certain advertised and well established products of industry.

In order to start the investigation, it is imperative that the industry keep adequate records of all cases of absenteeism, cause, occupation, length of disability, curative agent, time of year absent, etc., and this study alone will reveal astounding facts that are easy of correction. It will be found that the greatest factor in absenteeism from work is not the serious ailment but the so-called trivial illness which is easily correctible and preventable if a little real application is made to the problem.

What indifference is shown in the average industry to the comforts of employees—such, for example, as the arrangement of the work in an environment which is conducive to health for the various calls of nature. Facilities are often lacking, and, if present, are so situated as to be inaccessible or inadequate for the needs of the employees. Often it is claimed to be impractical to permit of sufficient time away from the job adequately to fulfill the various body functions. Constipation, the curse of American manhood and womanhood, is due, in my opinion, to the demand for speed in industry and life today. We are too busy to attend to this call of nature, with the result that the pathways for the impurities and wastes of the body are only made to act under the lash of artificial means, and their poisons remain in the system to poison other organs and disrupt their harmonious function and predispose the owner to illness which otherwise would not occur. Constipation alone produces more absenteeism from work than the much abused cold, for it is generally the constipation evil that so lowers the resistance of the worker that he becomes susceptible to colds. In order to function properly, the human machine must be kept clean both within and without.

I would suggest that a comparison be made of the absenteeism rate of an industry which has no medical policy with that of one which has a definite medical policy and a competently equipped medical department to carry out its work. Such a comparison will readily prove the value of such a policy.

Section XIX

Industrial Medicine and Surgery — Its Past and Present Status

THE physicians and surgeons who, 20 years ago, were struggling against opposition from their own profession in their chosen field of industrial medicine and surgery are today rewarded for their courage as the pioneers of this new branch of specialized medicine. At the inception of this specialty the so-called industrial physicians and surgeons were looked upon as performing a service that was unethical and beneath the dignity of the average physician; they were referred to as "company doctors."

It was true that these pioneers were members, in good standing, of the various Medical Societies, but they received very little if any aid or advice of a constructive nature. Whatever interest was forthcoming was of the sort to belittle their efforts and to discredit them in the eyes of both employer and the employee. This state of feeling I have always attributed to lack of information of the right sort, to the fact that the work of the industrial surgeons was not clearly understood by the majority of their medical brethren.

In every new endeavor or movement there have always been and always will be found people who are unfitted, both professionally and ethically, who take up the new specialty with an ulterior motive actuating their efforts. These individuals by their actions bring discredit to those who have the welfare of the movement at heart and whose services are honestly devoted to the elevation of the particular work engaged in. The men who, by their honest efforts and ideals, are serving industry must perforce suffer the stigma that the discreditable ones bring into industrial medicine and surgery. But must those who are a credit to the specialty be obliged to suffer equally with the undeserving? A few misfits in any profession are not exemplary of all engaged in that profession.

In this new specialty, made necessary by the remarkable progress of industry, it was essential that new practices and theories be placed in operation. The medical side of industry was something new, and there were no established practices to follow and no medical precedents to guide those who were asked to work out this new field. Industrial medicine was not taught in medical schools, nor was it practiced to any great extent in hospitals. The general medical profession was unacquainted with the various requirements of the industrial medical specialty. There was no agency to which the industrial employer could turn for guidance. The medical profession at that time was clothed in a cloak of mystery and very little filtered out to the layman for his enlightenment.

The executives at the helms of large industrial organizations were aware that a new specialty was about to be introduced into their plant operation, and they set about to outline a plan of medical policy. They realized that good health and freedom from disabling defects made for a safe employee and one who, by reason of his good state of health, was able to produce commodities or render a service of better quality and in a larger quantity, and at a more economical rate, than was previously demonstrated by unhealthy and physically defective employees. It became apparent that the worker must be compelled to maintain himself in a good state of health in order to produce a fair return to the employer for the wages paid him.

In the early days of industrial medicine efforts were directed toward weeding out those individuals who were physically defective and placing them in positions where their physical defects would permit them to do work efficiently

and without hazard to themselves or those about them. As new employees were taken into the service of industry, their physical condition was an unknown quantity, but it was necessary for the employer to know to a certain extent the physical state of his employees before entrusting them with expensive and very often delicate machinery. The examining of all new applicants and fitting them to the work they were to do was the cause of the main criticism from the medical profession. The selecting of physically fit men for hazardous work met with opposition at once from the profession; some of the statements that were forthcoming were to the effect that these physical examinations were of little value—that it was the scheme of ill trained, poorly equipped and financially distressed doctors, who were employed by unscrupulous corporations, at a small wage, to get rid under the guise of medical examinations of old employees who were no longer fit and that if the examination were made by the employee's family physician a more efficient and thorough examination would result. This opposition soon demonstrated that the industrial surgeon was criticised not because of violation of medical ethics but because of professional jealousy and human weakness. It was only unethical and wrong when someone else was making the examinations and doing the industrial surgical work; when the doctor in private practice secured this work and remuneration the status of industrial medicine changed to good standing and those so engaged were ethical. I have yet to see any physician or surgeon refuse industrial work when the opportunity was presented to him. This criticism and opposition did not originate with doctors who were otherwise busy in their own practices and who were willing to permit others to make a living at their own profession, but came from the little fellows and the very ones who were incompetent by their training and experience to handle this class of work.

With this opposition coming from the medical profession who, by their position in the medical world, should have cooperated with large industrial corporations in the working out of their respective medical policies, and there being no desire to aid in establishing this medical specialty, it was apparent to those in charge of industrial institutions that it was necessary to start from the ground up and work out their own policies from actual experience. Having nothing to base their efforts on in this new line, is it strange that some employers were unfortunate in the selection of their personnel and that the service was of a mediocre type? The resulting inefficiency of the medical policy made them open to criticism from their employees and the outside medical profession, but there is not to my knowledge any instance where such a condition was brought to the attention of the employer that a change was not forth coming and the policy altered to improve the service.

ANOTHER side to the industrial medical situation that caused criticisms to be directed wrongfully at the industrial physician was that of employers who had an ulterior motive in the formation of a medical policy for their employees. The results from such practices were questionable indeed. They would give their employees medical service, often of a low standard, and other so-called welfare service in order to keep down the rate of remuneration to the workers. This aroused the old cry of "pay us more money and less welfare and we will get these services ourselves". Then there was the individual who placed money ahead of the human element and of justice, causing the greatest odium to be attached to industrial men whose intentions were good. For small wages poor and inefficient medical and surgical service was obtained for the sick and injured worker, when better results would have been effected had the employer been more generous with his money and secured the services of those more fully qualified by experience and education to do this work. This policy of cheap medical service was the ammunition furnished in the largest abundance to the medical profession for criticism of the industrial medical and surgical profession as a whole. Much of this criticism was justified, and even today in some fields the policy of cheap service for industrial injuries is still prevalent.

The majority of employers of labor in industry, however, had the welfare of their workers at heart and their efforts were directed along lines of honest service, with the result that they went ahead with a definite medical policy on business principles, regardless of lack of cooperation from the general medical profession. They formulated practices and policies that today are shining examples of what can be accomplished in industry by a commonsense program of health conservation for employees. These results are made possible by the organizing and maintaining of medical departments whose personnel is composed of competent, well trained, industrial medical specialists, such as are now found in all large industrial organizations.

PRESENT industrial medicine and surgery was made possible by the cooperation of a large number of medical and surgical men and women who had the honest convictions of their ideals in this work and who were endowed with moral courage to continue regardless of opposition and criticism. Today these men and women have reaped their reward as the pioneers in this specialty, as it is now an assured fact that no longer is industrial medicine and surgery to be frowned upon, but it is a specialty that will bring to the medical profession greater value than any other specialty in our chosen work. Its rise in our profession can better be measured by the number of physicians and surgeons who are not doing some sort of industrial service, of which there are very few indeed, rather than by the number so engaged. The honest and square dealing of the pioneers in industrial medicine has enabled them to reach their goal early, and to obtain recognition by the medical profession and a place in the sun for industrial medicine and surgery.

There are still many criticisms heard of incompetent work done by physicians in industry, but toleration has broadened, and soft words are more frequently used, as the former critics of this work are now dyed-in-the-wool industrial surgeons, who are enjoying the fruits of their affiliations. These former critics, once in the service and acquainted with the ramifications of the industrial medical and surgical problems, are

quick to sense the great work that has been accomplished in the past, and to see the great era ahead for this specialty and the value of its possibilities to general medical science.

A PECULIAR situation has been apparent during the past 20 years, and that was that criticism originated not from those most vitally concerned, the employer and the employee, but from those on the outside who were unacquainted with the real situation in industry and who received the seed of their gossip from disgruntled and jealous individuals who had axes to grind. The executives responsible for business prosperity would have been the first to detect inefficiency or incompetent work by their medical men, and would have taken steps to discontinue their medical policy or revamp it if it was a failure or was causing injury to their employees. However, being acquainted with the constructive work going on, they cooperated with their doctors; and this will to aid has developed some of the most efficient medical departments in industry. Much of this was due to the medical advisors having foreseen the great necessity of lay instruction in first aid to the injured in their companies. The opposition to this has about died out, but there are still a few who cannot see its advantages from the human side and believe that laymen are usurping the medical man's prerogatives.

The examining of applicants for employment and periodical re-examinations of employees in industry are responsible to a great extent for the present standing of industrial medicine and surgery.

The value of these two routines to industry was very evident to the business executive and he did not hesitate to put them into operation.

With the advent of workmen's compensation laws in the various states it was imperative that an industry have its medical policy broadened to care for employees injured in line of duty. As the employer must pay the bill for services to an injured employee and be responsible for the employee's future earning ability, it is no more than right that the employer should know that his money is being spent for competent, efficient medical service and that he have the choice of the surgeon to conduct this service. This would not be necessary if all physicians and surgeons were of equal calibre as to education, skill and experience; but unfortunately that era of perfection has yet to be attained. With these laws in effect there came criticism from the medical profession that the large industries, through their medical representatives and their medical departments, were taking the bread and butter from physicians engaged in private practice, and that no matter who paid the bill the employees should be permitted to select their own doctors to treat their injuries. This would be ideal if the employees knew what doctor was able to handle the condition at hand; many times their selection had been to their own detriment, as results showed. The fact regarding private physicians treating traumatic cases in industry is that very often they were incompetent to treat conditions that came into their hands, owing to their lack of experience and not knowing their own limitations. That condition does not exist today to a very large extent, as a great many of the private physicians do large quantities of this traumatic work and are well qualified.

This condition prevailing in the early days of industrial medicine and surgery was one of the main reasons why executives in industry saw the necessity of establishing their own medical departments where their doctors would, by experience with a large number of industrial injury cases, be better qualified to care for those conditions which were prevalent in their individual company. There were so many different methods of treatment by the average doctor for each injury and results were so far from satisfactory that the need of a centralized medical service was evident. Especially was this true in the treatment of fractures, results of which cases have been far from flattering to the doctors who treated them. Experience in treating large numbers of like injuries makes a surgeon better qualified to treat others of the same kind than the physician who only sees an occasional case of each. The fact that the industrial surgeon is always certain to hear of his failures from the employees and his employer is a guarantee that his services will be competent and his results satisfactory; he cannot afford to have many failures if he is to do work for that particular industry. There is plenty of room for all those in the medical profession who desire to do industrial medicine and surgery today, as the surface of this specialty has been but slightly scratched and the possibilities of increasing health conservation are unlimited.

I WISH to dispute the often heard statement that the industrial physicians and surgeons are poorly compensated doctors, and that from an economic point of view they are financially inferior to the average general practitioner. Their economic rating will compare very favorably with the majority of the medical profession, and many will rate with the leaders in our ranks. They receive compensation only in comparison with the calibre of their work. If they deliver efficiently they are compensated accordingly, and if their service is of an inferior grade they are soon dispensed with. It is a fact that some of the large casualty insurance companies are responsible to a large degree for the poorly compensated industrial medical men, as they have in the past endeavored to have this work given to those whose services could be had at a low price. Some of the medical departments of large insurance companies farm out this work to the geographical doctor at a minimum fee, and if their results have not been of the best it was due to poorly trained physicians or those doctors who did not know the limits of their skill. The knowledge that some of the ill results obtained in traumatic surgery originated not with the regular industrial surgeon but with the doctor in private practice proves that some of the criticism laid at the industrial surgeon's door was not merited.

We must not call physicians who see only an occasional accident case industrial surgeons; and when results are not as desired we should place the censure where it rightfully belongs. If every doctor in private practice who sees traumatic cases were to be called an industrial surgeon, then the greater proportion of our medical profession would be of that specialty. Today there are but few doctors who do not have some con-

tact with a commercial or industrial organization, or have some affiliation with an insurance or casualty company. So, if we are all tainted with industrial medicine and surgery, we are in the same boat and should pull an even stroke on the oars of cooperation and help to bring the good ship "industrial medicine and surgery" into the port of favorable public opinion.

THERE is marked opportunity for improvement in this specialty today. But just how is this to be accomplished, and what are the necessary steps to be taken to raise the plane of work done?

The hospitals recently have seen the light from the financial standpoint, and they are quick to receive industrial cases into their institutions, be they large or small. The bills for services rendered and for hospitalization of these cases are guaranteed by the employer, and there is no large deficit remaining, as is so often experienced from private cases. On the staffs of the large hospitals the surgeons are beginning to feel that this traumatic surgery has been neglected by them in the past, and they are in a receptive mood to include it in their work. They see many industrial surgeons in their own hospitals operating at one time more cases than they might operate in a week in regular pathological surgery.

There have undoubtedly been many causes of jealousy and resentment on hospital staffs, owing to the knowledge that the industrial surgeon was filling the hospital beds with the guaranteed paid cases and reducing the number of beds available to the pathological surgeon for his charity or moderate-priced patients.

Great and drastic changes are in the offing for the medical and surgical profession. We must awaken to the fact that customs have changed, and that what was the practice yesterday is obsolete tomorrow.

Large industries had to meet this changing condition in their various activities, and they have prospered thereby. We too are obligated to change our methods and ideas to conform to modern advancement.

INDUSTRIAL medicine and surgery must first be included in the curriculum of the medical colleges—not as few hours of lectures and operations, but a complete course dealing with the fundamentals and all the various phases of the specialty. It must include the preventive as well as the curative side of the science, and only those qualified to teach this subject from actual experience should be selected; there should be no attempt to teach it from theory. Contact should be had by the medical college with industry, so that the student may have the opportunity of securing the actual feel of the industrial atmosphere in his formative years.

The course of industrial medicine and surgery should be complete, and should include the following features, all of which are essential to the proper understanding of this specialty:

A. Physical examination of applicant for employment.

B. Fitting the employee to the work that he is to perform with safety.

C. Formation of medical service in industry and its operation.

D. Industrial medicine and surgery and what it means.

E. Re-examination of employees in industry to detect incipient diseases.

F. Industrial diseases, their prevention and their cure.

G. Prevention of accidents in industry.

H. Prevention of absenteeism from work on account of illness.

I. Sanitation and hygiene in industry.

J. First aid instruction and methods of teaching and conducting first aid.

K. Industrial or traumatic surgery in its various forms.

L. The rehabilitation of the industrial cripple.

M. Vocational training of industrial handicapped workers.

N. The surgeon's relation to the claim and legal profession.

O. Research in industrial medicine and surgery.

With some such course of instruction in effect in institutions preparing the student for the future, the next step is to secure hospital and medical department affiliations to round out the student before he actually applies for his first position.

Hospitals should be encouraged to establish industrial clinics and make the necessary provision for the care of this class of cases, and should encourage the staff to set up a regular industrial division to facilitate this work in the hospital.

Large insurance companies through their clients should be enlightened as to the improvement in the routines of handling industrial cases, so as to secure their cooperation in this work and financial aid from them in the establishing of clinics and research work.

One of the State Board requirements for a doctor of medicine should be that each candidate pass an examination on industrial preparation. The various medical and surgical societies should be influenced to include in their sections one of industrial medicine and surgery, and at regular intervals throughout the year devote meetings to the discussion of this work.

In conclusion, it is desired to impress upon the general medical profession that they must seek the assistance of large industrial executives in their desire to bring industrial medicine and surgery to the place it deserves in the science of medicine.

If they are really in earnest in this desire they will, by their cooperation, show the industrial executives from a sound business standpoint what their true desires are and what they expect to accomplish for the improvement of health conservation of those in industry.

Industrial executives, for the greater part, I believe, are at present satisfied with what their medical representatives have accomplished for them and their employees. Before they will welcome a change in their medical policy they must be impressed with the fact that the movement for improvement will include all the phases of industrial medicine and surgery, and that is not for the purpose of securing control of the surgical work of those who have given the greater part of their lives bringing the specialty to its present state.

Cooperation and sincerity must be the slogan between the medical profession in general and that important and growing part of the profession in industry.

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The Time When

THE TIME when the worker in industry, freed from the fear of disablement, of poisoning, of illness, may work and be happy in industry, the time when the industrial manager need no longer fear that all the labours of his mind and the anxious care expended upon his program of work, may be thrown into chaos by the sudden appearance of illness amongst the workers or by the subtle influence of suspicion, misunderstanding or obstruction . . . that is the time toward which all management that contains the elements of survival is directing its efforts. To some executives this may seem as remote and impossible of attainment as the millenium, too much of a dream to be practical, too visionary —except as it may be put away as always tomorrow's ideal. But to other executives it represents the long view; and, because it is an ideal—in fact, *the* ideal in personnel relations—it is never absent from their conscious outlook. The difference between these executive attitudes is the difference between a preponderance of emotional application in the one, and of intellectual anticipation in the other. The chance of survival in any management is in direct proportion to the ratio of these elements; emotion may be useful in contacts, but intellect is the *sine quo non* of planning.

Howard Collier, of Birmingham University, from whose address the foregoing words are quoted,[1] goes on to say:

"The man is not yet born, nor is the method yet devised which will enable the industrial manager to manage a personnel which is not really healthy."

And he points out that being really healthy involves not the physical factors only, but also the individual mental, emotional and environmental factors.

It is well to cherish an ideal, if for no other reason than because it is a reminder of duty. Mr. Collier's carefully chosen words should be carved in large letters on the wall of every director's room, and read, as an invocation, at every director's meeting.

"When the worker . . . may work and be happy," contains the complete mutuality of the contract of employment:

The "worker may work" expresses his duty to *work*—to deliver his part of the interchange of values which balance each other, to bring to his work the ability to do it, the physical fitness to perform it without injury to himself or his fellow workers and without imposing upon his employer more than the irreducible minimum of indirect labor cost from subjective causes, such as his physical sickness or his mental or temperamental idosyncrasies.

And "be happy" expresses his employer's duty to make and maintain the situation of the worker's work and its environment free from objective causes of injury and disability, to the end that both employer and employee may be happy.

Here there is mutuality of obligation and mutuality of privilege. Under the stress of depression conditions these have become confused. But, being basic, they will straighten out as (1) the worker's duty to *work*, and (2) the employer's duty to *pay*—in both the direct coin of wage or salary, and the indirect coin of such supervision as will at least point toward the ideal pictured by Mr. Collier.

Some of the confusion has been the result of the worker's desire to hear that it is his privilege to be paid. And some of it is the outcome of the employer's self-imposed limitation of his own duty as nearly as possible to the payment of his direct labor cost—his reluctance to accept the indirect labor cost of supervision intellectually as an obligation, rather than emotionally as a privilege. This limitation and reluctance have been overcome, to some extent, by compensation and occupational disease laws; and these laws, in turn, have begun to educate the employer to the facts that:

1. The indirect labor costs are an *obligation which, by proper supervision, can be reduced*, and
2. *The only proper supervision is medical.*

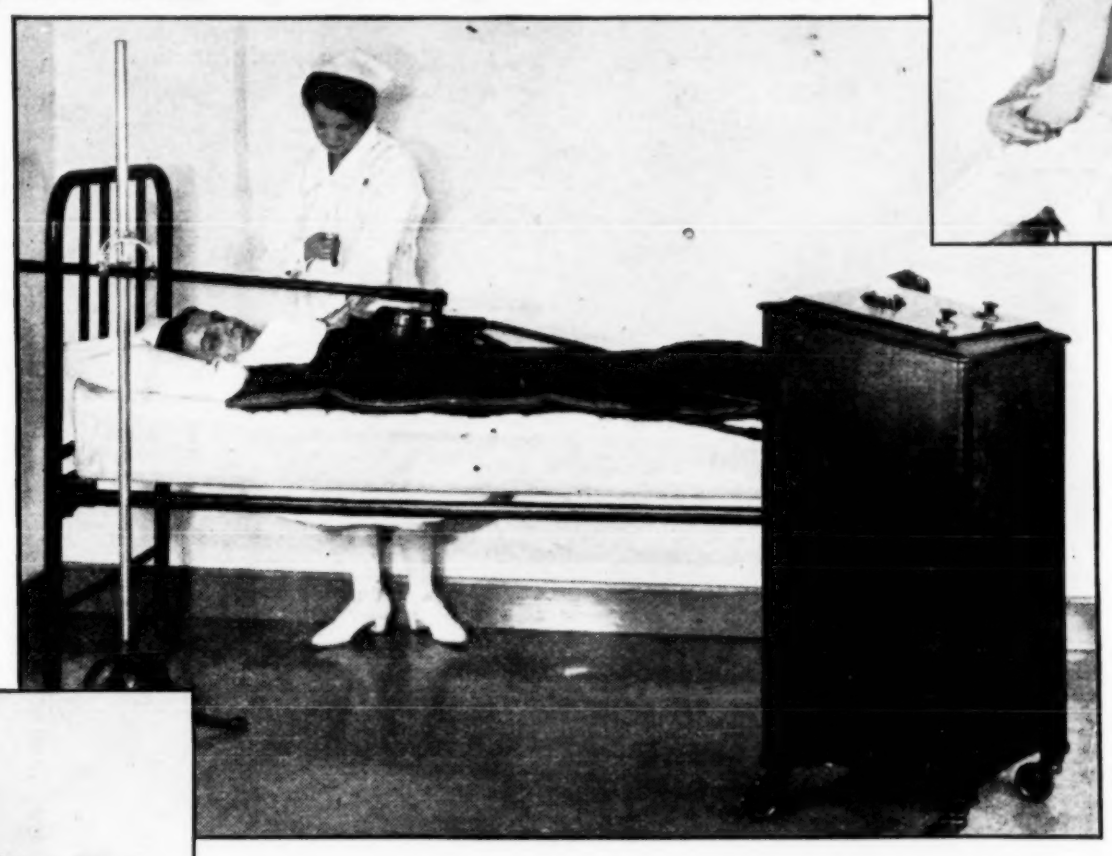
The picture, drawn by Mr. Collier brings to mind another picture of the same kind,[2] which needs only slight paraphrase to put it among the natural sequelae of "the time when:"

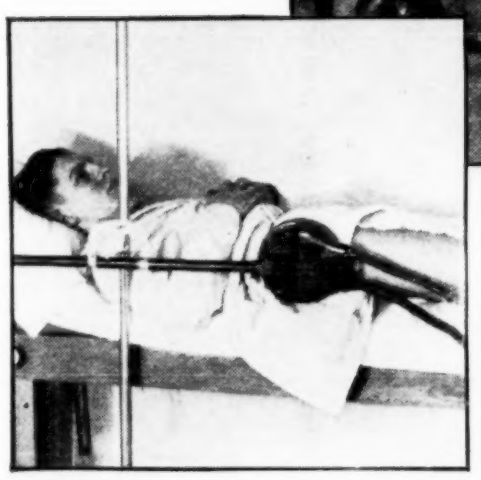
"After this it was noised abroad that Mr. Aged Employee was taken with a summons by the same post as the other, and had this for a token that the summons was true, that his hand had wavered and his eye was blurred. When he understood it he called for his friends and told them of it. Then he said, 'I am going to my retirement, and though it is only with much work that I have got thither, yet now I do not repent me of the perseverance I have been at to arrive where I am. My tools I give to him that shall succeed me in my work; my experience and skill to him that can get it. My marks and scars I carry with me to be a witness for me that I have served him well who now will be my rewarder.'"

1. See p. 326 herein.

2. Pilgrim's Progress.

INDUCTOTHERM





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Industrial Medicine and Surgery

Medicine and Industry*

I WONDER whether there is not a real danger that in the refinement of your thought and in the analysis of the factors which make for success in personnel management, you might not overlook the deep and the essential simplicities of the subject. No one will deny or belittle the importance of organization, of training, of mental dexterity, of tact and of understanding in the proper management of people, but there are certain basic conditions which must be fulfilled before these more or less secondary requirements can achieve their purpose. The man is not yet born, nor is the method yet devised which will enable the industrial manager to manage a personnel which is not really healthy. Health is basic, everyone admits this in theory, in practice it is sometimes disregarded. Sick men, poisoned men, ill-nourished men and women, people who are living in impossible social or physical conditions, simply defy all rational management. Robert Owen preached this doctrine 150 years ago, and we have not really learned its importance yet.

If it should happen that all your well-meant efforts to lead your personnel in happiness and harmony towards sound industrial purposes should fail, let me suggest that the explanation of that failure probably is that some fundamental health factor in the working environment has been overlooked. If the worker is not healthy, all your efforts to achieve right relations with him, and therefore all your efforts to reach real industrial efficiency, are doomed to failure. A healthy man is happy, he is keen, naturally generous, understanding and reasonable. It is the sick man, whether he be worker or manager, who is obstinate, bitter and unreasonable.

I am using the word health in a wider sense than is customary. I do not confine the term to mere fitness of the body. If we have a fit body, we must ask and be able to answer the question, "What is it fit for?" before we can claim to be healthy. I should define health as "being the harmonious adjustment of the whole self to its entire environment." That whole self, I assert, is a unity composed of bodily or physical, mental or intellectual, and emotional or spiritual parts or aspects. In the same way, our entire environment consists of a physical world, a mental-social world, and an emotional-spiritual world.

From this it follows, as it seems to me, that if as industrial managers you concentrate too exclusively upon any one or any two of these aspects of the whole man, to the relative neglect of the others, you may expect that your personnel arrangements will falter and will fail.

It follows also, that if you should find that the wheels of personnel management are not working quite so smoothly, it is up to you to seek to diagnose the roots of the trouble. You should not look upon the bodily plane alone, neither should you look for the solution upon psychological lines alone, but take the widest view possible. There may be emotional forces working within the factory which can be controlled only by suitable emotional adjustments on the part of management and workers. This sort of diagnosis is never easy, but easy things are seldom worth the doing.

When faults occur within a complex machine you do not hesitate to call in the expert engineer. It is reasonable to suggest that when faults are evident in personnel management or when there is statistical or other evidence that the health of the working organism is at fault, you should call in an industrial health diagnostician?—a hygienist? Health is very complex. It often happens that disorders that appear on the surface as bodily ills are really due to psychological causes. It is equally true that disorders which appear to be purely psychological are often due to faults in bodily structure or function. It is just the same in industry.

Certain speeds and rhythms are natural to the human body. The cyclist knows that it is the speed that kills. It is possible by the exercise of a concentrated will-power, for a time, vastly to exceed this optimum bodily rhythm. By offering high pecuniary rewards or by the exercise of compulsory fear, it is possible for the human worker to achieve amazing feats of output. This, however, can only be done for a time, and at the expense of nerve strain and of resultant ill health. It is this nerve strain and its associated emotional disturbances that play havoc with good personnel relationships. And the worst of it all is that the worker himself does not know what is the cause of his deep disease of mind. Both he and you blame it upon this and that, but the real trouble is bodily. Nature is very quiet but very persistent. If we defy her, she does not make a fuss, she simply sets up a wall for us to try a butting match with, and we always lose.

You will observe that an excessive speeding up with its defiance of natural rhythm is essentially a physical matter. Nevertheless the evidence of its presence does not appear upon the physical level. It appears upon the emotional-mental level. It appears as excess labour turnover, as excess lost time or as an excessive incidence of those strange disorders which we call nervous debility because we have not the courage or clarity of mind to call them by their proper name.

This, then, is my conclusion concerning the whole matter of health and personnel management. Do not take narrow views either of your problems or of the possible solutions of them, and above all, do not be too proud to consult the expert upon a problem of such profundity and importance to the well-being of the industrial organism.

You may reasonably object, "Where shall we find trained hygienists who can act as health advisors to industry?" I am forced to admit that such persons are at present few and far between. The reason for this is twofold. On the one hand there has been no conspicuous demand from industry for them—and that matter I must leave to industry; whilst on the other hand no source of supply of industrial hygienists has hitherto been organized.

The new department of Industrial Hygiene and Medicine in the University of Birmingham is designed to supply this second defect in our national health service. It is one of its aims to train industrial hygienists to serve industry in the capacity of diagnosticians and advisors for health. We hope by research, by investigation, and by the creation of a sort of central information bureau of industrial health to hasten the time when the worker in industry, freed from the fear of disablement, of poisoning, of illness, may work and be happy in industry, the time when the industrial manager need no longer fear that all the labours of his mind and the anxious care expended upon his program of work, may be thrown into chaos by the sudden appearance of illness amongst the workers or by the subtle influence of suspicion, misunderstanding or obstruction.

This, in brief, is the sort of contribution industrial hygiene can make to personnel management.

*Howard E. Collier, M.C., M.B., Ch.B. (Department of Industrial Hygiene and Medicine, Birmingham University) addressing the Birmingham Conference; *Labour Management*, June, 1935.

The Prognosis of Silicosis

DISABILITY and death are ordinarily highest in the acute form of silicosis, often occurring within a few months after exposure begins. Only extreme exposure could produce such results. In the chronic form of the disease, pneumonia may occur in the first few months, after which considerable immunity to this disease appears to follow. The controversial point is whether silicosis predisposes to tuberculosis or is antagonistic thereto.

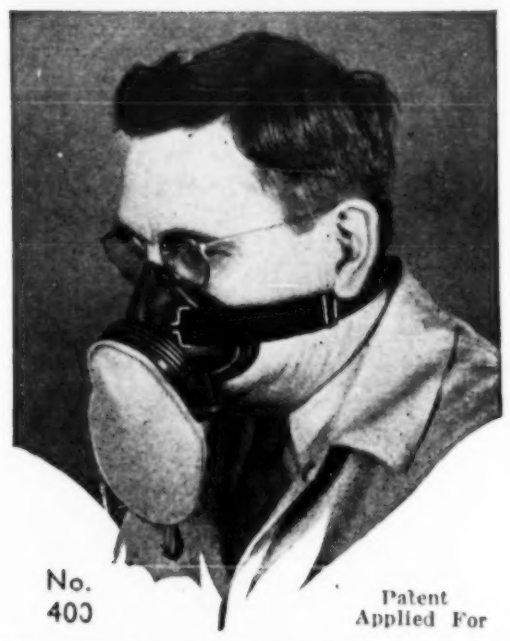
The results of our* x-ray examination of 912 sandstone quarrymen in the Amherst district of northern Ohio, in 1926, showed 13 cases complicated with tuberculosis—an extremely low rate and lower than in average industrial employment. A partial follow-up since that date fully substantiates these findings. Also, a subsequent check up by the county health commissioner, Dr. H. R. O'Brien, of school children in the families of these quarry-workers, made in 1934, to detect contact spread of tuberculosis, showed rates no higher than for those in neighboring villages, although one group of 40 children between 15 and 19 years of age ran 57.5% positive Mantoux tests, whereas the next highest village, Oberlin, ran 41.4%, both low when compared to usual city

* From *Ohio Health News*, June 1, 1935. (A lantern slide demonstration was made of x-ray chest pictures, where silicosis had appeared to check tuberculosis, when this paper was read at the recent meeting of the Ohio Academy of Science.)

DEPENDABLE PROTECTION

The Quality Line

Against Dusts in Industry



The respirator illustrated above is the new Willson No. 400 Bag Respirator approved by the United States Bureau of Mines. Its 40 square inch filtering surface, affording low breathing resistance, assures utmost comfort and promotes constant use by workmen in atmospheres of dangerous dust. Total weight of No. 400 is slightly over 5 ounces. The Willson approved long-life filter solves the filter replacement problem: occasional blasts of compressed air played into the bag keep it effectively clean; it is almost sure to last as long as the respirator.

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LORENZ BOHLER has long been internationally famous for his many successful developments in methods for the treatment of all kinds of fractures. The German editions of his book are well known in America, but their use has naturally been restricted by the limitations of language. Even a fair reading knowledge of German is not sufficient for a complete grasp of principles or a reliable understanding of details of technique. Many American surgeons have wished for a complete and reliable English translation of Dr. Bohler's work, and one is now ready. Not only a complete translation of the fourth German edition, but added material, not previously published, from Dr. Bohler's latest experience with Fractures of the Spine, and of the Neck of the Femur. Not a dull machine-like translation by an uncomprehending literary hack, but a work of appreciation done by a man who is himself a well known master-surgeon. Ernest Hey Groves, editor of the British Journal of Surgery, an authority on fractures who deliberately postponed revision of his own excellent book on the treatment of fractures in order to pay tribute to the Viennese master of the art, and make his work better available to all English-speaking surgeons. It has been well said that Dr. Bohler's book reveals he has that quality of genius which consists in the infinite capacity for taking pains. All of his painstakingly acquired knowledge and experience is now available to every American orthopedist and general surgeon.

Bohler's methods are not experiments but a carefully compiled and developed system, superior to that commonly in use, covering many years experience with a large number of cases. Many American practitioners have visited his hospital where thirty to forty visiting surgeons from all countries watch his work daily. In fact the Bohler experience and methods have been for several years increasingly used in many American cities with success and satisfaction. In the words of a well-known California surgeon, "These methods, applied in the treatment of injuries result in a lessened disability period, an earlier return to the proper industrial status of the patient, a shortened period of hospitalization, and the least possible impairment of function. The morale and physical well being of the injured are enhanced and economy to society ensues."

No surgeon should rest content until he has a copy of Bohler on his bookshelf for reference, for comparative purposes to aid him in improving his own methods and technique. The book is a liberal education in fracture treatment.

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rates. Ohio vital statistics likewise show very few cases where silicosis, pneumoconiosis, or other cirrhotic disease of the lungs, has contributed to death—the number of deaths being 14, 5, 6 and 14 for the years 1930 to 1933, respectively.

Only about one in 10 of silicosis cases reported to the Ohio Department of Health in the past three years has shown sputum evidence of tuberculosis. Most of these, where silicosis was definitely established, were workers of many years' exposure who had reached old age.

The Picher Clinic studies of the Public Health Service disclosed 3.46% silicosis-with-tuberculosis in 1928 among 7,722 workers, and only 2.48% in 1929.

In the South African deep gold mines, the workers have two diseases—tuberculosis and silicosis. The first is probably largely contributed to by the inhalation of irritant mine gases (the products of explosives) and a highly moist atmosphere at a high temperature. Irvine, in a Report of the Miners' Phthisis Medical Bureau for the Three Years Ended 31st July, 1932 (p. 36) shows that of 895 original cases of primary silicosis in 1917-1920, 407 had died of silicosis (predisposing or contributory) at the end of the 12th year thereafter; of 260 original cases of tuberculosis with silicosis, 229 had died from silicosis (predisposing or contributory); and of 130 original cases of tuberculosis, both "open" and "closed" in 1919-1923, 71 had died from tuberculosis at the end of the ninth year. Likewise (p. 37), remarkable figures are presented, showing great decrease in silicosis-with-tuberculosis—a drop of 96% in the case rate over a 14-year period, and, in fact, in one year, 1927-28, no such disease was reported among the approximately 15,000 European miners employed.

No doubt many cases definitely disabled by silicosis, either alone or complicated with non-tuberculous infections, have been incorrectly diagnosed in the past as tuberculosis.

That silicosis progresses for more than two years after cessation of exposure to siliceous dust seems likewise very doubtful.

It would seem that silicosis is a condition rather than a disease, but a condition which predisposes to local infection in the lungs, and occasionally such infection is tuberculosis, or mainly tuberculosis. When healing occurs in tuberculosis it is evidenced by the formation of scar tissue. The scar - tissue - forming character of silicosis should be expected to check the progress of tuberculosis and this, we think, it does, at least until the terminal stage of silicosis, or silicosis-plus-non-tuberculous infection, is reached.

Occupational Diseases

Illinois O. D. Act, as to Section 1, Unconstitutional

THE SUPREME COURT of Illinois, in a decision rendered April 17, 1935, held Section 1 of the Occupational Disease act of that state unconstitutional.* The full text of the decision follows:

GERTRUDE BOSHUIZEN (hereinafter called the plaintiff) brought suit in the superior court of Cook county against the Thompson & Taylor Company (hereinafter called the defendant) to recover damages under the provisions of paragraph (a) of section 15 of the Occupational Disease act for violation of section 1 of that act.

The amended complaint in part charged that the defendant is a corporation engaged in Chicago in the business of jobber of teas, coffees and spices, and as an incident to said business the defendant engaged in the business of canning and packing pepper and other spices and preparing the same for market; that for a period of eleven months immediately prior to May 23, 1934, the plaintiff was in the employ of the defendant for hire, working in the defendant's plant in the canning and packing of pepper and other spices; that she was required in her employment to fill orders by pouring ground pepper and other spices into cans and other containers, to work in dust created by agencies used in the manufacturing process, to come into direct contact with dust created by such agencies and to be exposed to irritating and injurious dusts; that the work and process carried on by the defendant was likely and liable to produce illness and disease peculiar to the process and work so carried on, and subjected the employees of the defendant including the plaintiff, to the danger of illness and disease incident to such work and processes to which employees are ordinarily not exposed in other lines of employment, to-wit, illness and disease caused by irritating and injurious dusts. The defendant filed a motion to dismiss the plaintiff's amended complaint, alleging, among other grounds, that section 1 of the Occupational Disease act violates with other constitutional provisions, article 3 and section 2 of the State constitution and the fourteenth amendment to the Federal constitution. The trial court found section 1 of the act unconstitutional and entered judgment in favor of the defendant and against the plaintiff for costs. From that judgment the plaintiff has taken an appeal direct to this court.

Section 1 of the Occupational Diseases act is as follows: "That every employer of labor in this State, engaged in carrying on any work or process which may produce any illness or disease peculiar to the work or process carried on, or which subjects the employees to the danger of illness or disease incident to such work or process, to which employees are not ordinarily exposed in other lines of employment, shall, for the protection of all employees engaged in such work or process, adopt and provide reasonable and approved devices, means or methods for the prevention of such industrial or occupational diseases as are incident to such work or process." Smith's Stat. 1933, chap. 48, p. 1401; Cahill's 1933, chap. 48, p. 1375.

For the pupose of passing upon the construction, validity or constitutionality of a statute the court may resort to public official documents, public records, both State and national, and may take judicial notice of and consider the history of the legislation and the surrounding facts and circumstances in connection therewith.[1] Applying this rule, we find that the Occupational Diseases act is a specific statute passed in 1911 as a result of the report and recommendation of the Occupational Diseases Commission appointed by the Governor pursuant to a joint resolution adopted by both branches of the General Assembly in 1907 and continued by a like resolution in 1909. This type of legislation was a complete stranger to the common law, and section 1 under consideration here has no common law origin or history.[2] The section has no generally accepted body of precedents, no established standards of conduct and no common knowledge or understanding on which it is bottomed. It therefore follows that the constitutionality of section 1 must be decided from an examination of the terms of that section alone. In determining the validity of section 1 we give due weight to the rule that where two divergent, reasonable meanings may be given a statute, the interpretation which supports the validity, rather than the one which strikes it down, is to be approved;[3] and that the burden of showing the unconstitutionality of the statute rests upon the party assailing its validity.[4]

Section 1 does not include employees engaged in extra-hazardous occupations especially dangerous to the health of the employees but only those employees engaged in non-hazardous industries.[5]

Several cases involving different phases of the Occupational Diseases act have been here for review. The constitutional validity of section 2 was upheld;[6] the validity of the amendment of 1923 to section 15 was upheld;[7] section 15 was held not to violate section 13 of article 4 of the constitution;[8] section 15 of the act was held not to offend the fourteenth amendment to the Federal constitution nor section 13 of article 4 of the Illinois constitution;[9] the validity of the amendment to section 15

*Boshuizen v. Thompson & Taylor Co., 360 Ill. 160.

1. *Davis* v. *Farmers' Co-operative Equity Co.* 262 U. S. 312, 67 L. ed. 996; 23 Corpus Juris, Secs. 2001, 2005.

2. *First Nat. Bank* v. *Wedron Silica Co.* 351 Ill. 560; *Arquin* v. *Industrial Com.* 349 id. 220; *Keevan* v. *Peoria, Bloomington and Champaign Traction Co.* 277 id. 413; *Adams* v. *Acme White Lead Works*, 182 Mich. 157, 148 N. W. 485; *Pennsylvania Pulverizing Co.* v. *Butler*, 61 Fed. (2d) 311.

3. *Hunt* v. *Rosenbaum Grain Corp.* 355 Ill. 504; *People* v. *Anderson*, 355 Ill. 289; *People* v. *Dopp*, 343 Ill. 521.

4. *Reif* v. *Barrett*, 355 Ill. 104.

5. *First Nat. Bank* v. *Wedron Silica Co.* 351 Ill. 560; *Kelley* v. *St. Louis Smelting Co.* 307 Ill. 367.

6. *Burns* v. *Industrial Com.* 356 Ill. 602.

7. *First Nat. Bank* v. *Wedron Silica Co.* 351 Ill. 560.

8. *Zurich Accident Ins. Co.* v. *Industrial Com.* 331 Ill. 576.

9. *Labanoski* v. *Hoyt Metal Co.* 292 Ill. 218.

(Laws of 1921, p 444,) was before the Federal court[10] and it was there held that the amendment operated prospectively, only, and would not defeat a cause of action accrued before the amendment became effective; if given a retroactive operation the amendment would be unconstitutional as impairing the obligation of contract and as invalid interference with vested rights. There has never been a judicial pronouncement here upon the constitutionality of section 1.

It is contended by the plaintiff that section 1 has been the law for many years and its provisions enforced by judgments of this court; that thereby the court has recognized its validity; that the rule is, where a statute has been recognized as valid, indirectly or directly, in numerous decisions, then the maxim of stare decisis should be applied and the statute be declared constitutional. There is merit in this position, but the rule cited is not inflexible. While section 1 has been in force over twenty years, yet it is only within recent years that cases based upon its provisions have reached this court, and there is not a long line of decisions of this court upon the subject.[11] In 1931, there was presented to this court for decision the issue whether the statute originally enacted in 1927, providing that juries in criminal cases should be the judges of the law as well as of the facts, offended the provisions of article 3 and section 5 of article 2 of the State constitution. That statute had theretofore been before this court in different and varying forms in a very large number of cases, yet the decision in the Bruner case held the act unconstitutional. It was said in the Bruner case that though a statute had been interpreted and in force over a considerable period, yet where its constitutionality on the grounds charged has never been determined the statute is subject to attack on constitutional grounds. The statute granting to a master in chancery the power to grant writs of injunction when no judge authorized to grant such writs was present in the county was in 1923 declared unconstitutional.[12] That statute had been in force since 1845 and the power purported to be conferred by it had been frequently and commonly exercised. The rule deducible from the authorities is, that even though a statute may be venerable its old age does not render it immune against constitutional attacks.

Numerous cases are cited by the plaintiff wherein statutes speaking in general terms have been upheld. An examination of those cases will disclose that the employed words in those acts had acquired an intelligible and generally understood meaning at common law or had a definite, special, trade or technical significance. The distinction between the two classes of statutes is aptly drawn.[13] It is there pointed out that there are two types of legislative acts: (1) Those which prescribe a duty in terms sufficiently definite to

10. *Hoyt Metal Co.* v. *Atwood*, 289 Fed. 453.
11. *People* v. *Bruner*, 343 Ill. 146.
12. *Bottom* v. *City of Edwardsville*, 308 Ill. 68.
13. *People* v. *Mancuso*, 255 N. Y. 463, 175 N. E. 177.

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guide those upon whom the duty is imposed, but such certainty must arise from words used having either a technical or special meaning sufficiently known and understandable to enable compliance therewith or which have acquired an established meaning through common law or established precedents. This class of statutes is valid. (2) Those wherein the statutory duty sought to be imposed is attempted to be defined in novel and unfamiliar terms which have not yet acquired any definiteness or certainty. This type of statutes is unconstitutional. The application of this rule of differentiation will readily harmonize what appears at first glance to be an irreconcilable conflict between the cases cited by the defendant and the plaintiff.

It is well to observe that section 1 does not attempt to state what "devices" the legislative mind contemplated — whether respirators, masks, a certain system of ventilation or other mechanical devices. Did the legislature by the words "means and methods" intend to prescribe stated medical examinations, limited hours of labor, construction of a type of building or structure to permit the maximum amount of sunshine and ventilation in the rooms or places where the labor was performed, or other different means or methods? The answer to this interrogatory, if the act is valid must be found in section 1. To be valid the statute must prescribe a standard so definite, fixed and understandable as to permit a compliance therewith by one who desires to meet its requirements. The statute need not specify and particularize the exact norm, but it must lay down a guide that has either a definite, fixed meaning at common law[14] or by established and recognized precedents, or a trade, technical or definite, specific meaning. While the word "reasonable" has a fixed, definite meaning at common law as applied to a standard of degree and diligence, yet the word as used in section 1 cannot be given that sense, as it is employed as descriptive of the "devices, means or methods" commanded to be furnished and adopted by the employer. "Approved" has no definite, special, technical, trade or common law meaning, or meaning by established precedents. By whom the approval mentioned is to be made is left open to conjecture. Is the approval contemplated that of the employer using the particular device, or some other employer or employers engaged in the same industry, or the public generally, or a court or jury trying a cause arising out of an alleged violation of section 1? Even though an act on its face appears to have a meaning, yet if it is not possible to give it a precise and intelligible application under the conditions intended for it to operate it is void.[15]

In the present age, conditions and methods in the industrial world change rapidly and often somewhat radically. What is modern today may be obsolete tomorrow. Section 1, so far as employers and employees fall within the purview of that act, purports to be complete in itself. From the reading of that section the employer must decide whether his industry is included in the class thereby created and whether he must provide the "reasonable and approved devices, means or methods," and what they are, for the prevention of occupational diseases incident to the work of his undertaking and for the violation of the terms of which he must answer in damages and also be liable to prosecution for a penalty. The employer must on his own initiative determine for himself whether any disease suffered by his employee is one "to which em-

14. *Small Co.* v. *American Sugar Refining Co.* 267 U. S. 233, 69 L. ed. 589; *Connally* v. *General Construction Co.* 269 U. S. 385, 70 L. ed. 322; *Champlin Refining Co.* v. *Commission*, 286 U. S. 210, 76 L. ed. 1063.

15. *Mayhew* v. *Nelson*, 346 Ill. 381; *People* v. *Sholem*, 294 Ill. 204; *In re Di Torio*, 8 Fed. (2d) 279.

ployees are not ordinarily exposed in other lines of employment," and in that connection must determine the sense in which the word "ordinarily" is used in the section. The section furnishes him no guide for the solution of either problem.

Under section 1 the employer must be able to forecast accurately the devices, means and methods required of him to avoid liability under the statute. In a legal proceeding under section 1, by reason of its vagueness and indefiniteness, the rights of the parties are left to a court or jury for determination without a definite, certain, settled and intelligible rule of conduct determined by the law for their guidance. It necessarily follows that juries in that situation would be the judges of the law as well as the evidence, and in case of trial without a jury the presiding judge would have no stable, definite and certain rule of law for his guidance in administering justice between the parties. It would be unjust to hold the employer liable in the exercise of his business knowledge for his failure to guess correctly as to his duty under section 1 where the statute itself creates no criterion for his safe and sure guidance. Its provisions are so vague, indefinite, uncertain and incomplete that no sufficiently clear and intelligible standard of duty is defined thereby. A statute which requires the performance of an act in terms so indefinite, uncertain and puzzling that men of ordinary intelligence must necessarily guess at its meaning and differ as to its application transcends due process of law. Section 1 does not afford due process of law.[16]

Neither is the constitutionality of section 1, as urged by the plaintiff, saved by sections 11 and 12 of the act. Section 11, after stating it is the duty of the State Department of Factory Inspection to enforce the act and to prosecute violators thereof, proceeds as follows: "The Department of Factory Inspection shall give proper notice in regard to any violation of this act to any employer of labor in violating it, and directing the installment of any approved device, means or methods reasonably necessary, in his judgment, to protect the health of the employees therein, and such notice shall be written or printed," etc.

Section 12 is as follows: "If any occupation or industrial disease or illness or any disease or illness peculiar to the work or process carried on shall be found in any place of employment in this State by the inspectors of the State Department of Factory Inspection, or called to their attention by the State Board of Health, which disease or illness shall be caused in whole or in part, in the opinion of the inspector, by a disregard by the employer of the provisions of this act, or a failure on the part of the employer to adopt reasonable appliances, devices, means or methods which are known to be reasonably adequate and sufficient to prevent the contraction or continuation of any such disease or illness, it shall be the duty of the Department of Factory Inspection to immediately notify the employer in such place of employment . . . . to install adequate and approved appliances, devices, means or methods to prevent the contracting and continuance of any such disease or illness and to comply with all the provisions of this act." Cahill's Stat. 1933, p. 1376; Smith's Stat. 1933, p. 1402.

The term "any approved device, means or methods reasonably necessary" found in section 11, manifestly is no more definite than the words "reasonable and approved devices, means or methods" employed in section 1. It is urged by the plaintiff that the clause "reasonable appliances, devices, means or methods which are known to be reasonably adequate and sufficient to prevent the contraction or continuation of any disease or illness" used in section 12 of the act, qualifies the word "reasonable" contained in section 1 and expresses the meaning of the word "reasonable" as used in section 1. Waiving for the moment the issue as to the constitutionality of sections 11 and 12 in conjunction with section 1, the latter section is not made sufficiently certain and specific by section 12 for the further reason it does not determine whose "knowledge" is a standard by which the determination of what devices, means or methods are "known to be reasonably adequate and sufficient" is to be made. Whether the "knowledge" is that of the Department of Factory Inspection or its officers, a particular employer, employers generally or the people generally is left by the section to the conjecture and speculation of him who reads section 12. The question of whether a particular device, means or method is "reasonably adequate and sufficient" is answered not by section 12 but is left to the opinion of experts whose judgments may materially differ one from the other, or, as has often happened, the opinion of the same expert may change from time to time. It is apparent that the phrase "known to be reasonably adequate and sufficient" refers to the opinion of the factory inspector and no one else, for section 11 provides that the employer is required to install the devices, means or methods which are reasonably necessary, in the judgment of the State Department of Factory Inspection, to protect the health of the employees. If we grant for the purpose of this aspect of the case that sections 11 and 12 apply to section 1 and not to section 2 alone and the three sections 1, 11 and 12 are to be read together, we then immediately meet the important issue raised that if so construed there is then an unlawful delegation of legislative power to an administrative body, in violation of article 3 of the State constitution. Sections 11 and 12 purport to grant to the State Department of Factory Inspection the power to determine what, in its judgment, are devices, means or methods which employers should adopt, authorize such department to direct employers to install such devices, means or methods, and the employer is commanded to obey the order of the department in that respect under pain of a penalty for refusal. If sections 11 and 12 each fail to promulgate any standard by which the judgment of the administrative department is to be measured, controlled or limited, the department may arbitrarily decide "what appliances, devices, means or methods," in its judgment, are "approved," "reasonably necessary," "reasonable" or "known to be reasonably adequate and sufficient," or "adequate and approved." Neither section contains within its provisions any definite permanent, certain test or objective standard. It has often been held by this court that the legislative department cannot constitutionally vest in the discretion of an administrative body the power to determine standards of duty not definitely found within the act itself.[17]

The plaintiff with great earnestness urges that the case of Boll v. Condie-Bray Glass and Paint Co. 321 Mo. 92, 11 S. W. (2d) 48, decides in accordance with her contention the very issues here involved. We have carefully examined that case but cannot accede to the plaintiff's claim that the case is determinative of the issue here presented. A distinction of material moment to be noted in the comparison of the Illinois and Missouri acts is that the Missouri act requires the furnishing of "adequate and approved means, methods or devices." The word "adequate" was apparently assumed as making the standard definite and certain. Moreover, the Missouri court in its opinion calls attention to the fact that the plaintiff there came within the provisions of a section of the act which required the employer to furnish "adequate and approved respirators." A respirator is a particular and specific device exacted by the Missouri act. Any employer knows what a respirator is. By eliminating the word "approved," as the court there did, the act required an "adequate . . . . respirator." Again, the court there held that the defendant was in no position to urge the unconstitutionality of the statute requiring the employer to furnish "adequate means, methods or devices," as he had never furnished any "means, methods or devices" of any kind or character.

This court cannot cure the constitutional defects in a statute either by judicial amendment or construction, however beneficent the statute.

We are of the opinion that section 1 of the Occupational Diseases act violates article 3 and section 2 of article 2 of the constitution of this State and the fourteenth amendment to the Federal constitution.

The judgment of the superior court of Cook county is affirmed.

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16. *People* v. *Yonker*, 351 Ill. 139; *Mayhew* v. *Nelson*, 346 Ill. 381; *Welton* v. *Hamilton*, 344 Ill. 82; *People* v. *Sholem*, 294 Ill. 204; *Champlin Refining Co.* v. *Commission*, 286 Ill. 210; *Smith* v. *Cahoon*, 283 U. S. 553, 75 L. ed. 1264; *Cline* v. *Frink Dairy Co.* 274 U. S. 445, 71 L. ed. 1146; *Connally* v. *General Construction Co.* 269 Ill. 385; *Small* v. *Sugar Refining Co.* 267 U. S. 233, 69 L. ed. 589; *United States* v. *Cohen Grocery Co.* 255 U. S. 81, 65 L. ed. 516; *International Harvester Co.* v. *Kentucky*, 234 U. S. 216, 58 L. ed. 1284; *Chicago and Northwestern Railway Co.* v. *Railroad Com.* 280 Fed. 387; *In re Di Torio*, 8 Fed. (2d) 279; *Wabash Railway Co.* v. *O'Bryan*, 285 Fed. 583; *Detroit Creamery Co.* v *Kinnane*, 264 Fed. 845; *United States* v *Capital Traction Co.* 34 App. D. C. 592; *Ex parte Peppers*, 209 Pac. (Cal.) 896 *Glendale Coal Co.* v. *Douglas*, 137 N. E. 615; *State* v. *Crawford*, 177 Pac. (Kan.) 350; *State* v. *Levitan*, 210 N. W. (Wis.) 111; *Cook* v. *State*, 59 N. E. (26 Ind. App. 278) 489; *Abbott* v. *Andrews*, 455 S. W. (2d) (Tex.) 568; *People* v. *Mancuso*, 255 N. Y. 463, 175 N. E. 177; *Standard Chemical and Metals Corp.* v. *Waugh Chemical Corp.* 231 N. Y. 51, 131 N. E. 566.

17. *Welton* v. *Hamilton* 344 Ill. 82; *People* v. *Beckman & Co.* 347 Ill. 92; *People* v. *Yonker*, 351 Ill. 139; *People* v. *Federal Surety Co.* 336 Ill. 472; *Mayhew* v. *Nelson*, 346 Ill. 381; *Board of Administration* v. *Miles*, 278 Ill. 174; *Noel* v. *People*, 187 Ill. 587.

Workmen's Compensation

Realities of Workmen's Compensation*

WORKMEN'S Compensation may be said to be not unlike a stepchild in the field of American jurisprudence. Perhaps its want of legal parenthood and lack of tradition account for the slight consideration it has had from the organized legal fraternity and from recognized law schools. Until quite recently, compensation was accorded almost no recognition in your profession, although the subject had for many years obtruded itself upon the courts, and the decisions in compensation appeals had filled many hundreds of pages in the law reports . . . .

My approach to the subject today is rather in the legal concepts of compensation than in its economic or social aspects. If, therefore, undue emphasis shall seem to have been placed on certain legal phases of the compensation system, it should be regarded not as criticism of the system. The system is good; it has worked marvelous benefits to a class of persons too long exploited or whose rights have been too long neglected.

My comments here are as to some of the patent and outstanding realities of the system, viewed from the somewhat detached point of view of the lawyer. From this point we see the laws not only as they are written but also as they are interpreted and administered. And we shall also see how these laws have been expanded and construed in a number of respects into something quite different from the original thought and intent.

Workmen's Compensation differs in many respects, both in legal conceptions and in procedure, from the ordinary branches and forms of the law. It is a new conception; it has, we may say, no tradition behind it. It is not common law nor derived from the common law. As was said by Mr. Justice McReynolds,[1] in the Jensen case, "the remedy which the compensation statute attempts to give is of a character wholly unknown to the common law, and incapable of enforcement by the ordinary processes of any court."

Compensation does not lie in tort, although the facts out of which many claims arise would, in other circumstances, constitute tort. Rather does the right to compensation arise out of contract, either express or implied, implicit in the hiring.[2]

Yet it is not an action in contract, just as it is not an action in tort.

Negligence need not be asserted nor proved against the employer in order to claim compensation, nor does negligence on the part of the injured employee, the negligence of a fellow servant, nor the assumption of the risk of the employment bar the right to claim compensation.

Given the relationship of employer and employee, with perhaps an actual or presumptive joint election, together with an accident or injury sustained in the employment and arising out of it, with a consequent loss of earnings due to incapacity to work, the right to compensation follows as a matter of course; and the recovery is largely a mathematical determination, with the rate of wages, the length of disability and the scale of benefits in the statute as the mathematical factors. The questions of fact, however, which bring these factors into the equation are very often exceedingly complex, and not infrequently call for the skill and training of the attorney.

In a sentence, this constitutes the gist of the workmen's compensation system, as we know it in most of our states. But while preserving the general outline and underlying principles, the laws vary widely in different states and jurisdictions. These variations relate principally to the application of the law, both as to persons and employments coming under it, and the nature and definitions of the injuries covered by it, the scales of benefits accruing to the injured persons, or others claiming through them, the type of security for the payment of compensation, and the method of procedure for the enforcement of the right to compensation.

It is not my purpose to discuss the variations in the laws of different jurisdictions. With such differences existing, however, it is difficult to speak of the general system with uniform exactness, since some of the "realities" met with in one jurisdiction may appear somewhat unreal in another. But throughout the whole field of compensation we find many common characteristics and common trends, and it is of some of these I would speak.

One of the common characteristics in the various jurisdictions is the fact that almost universally the law is interpreted and applied by administrative officers who assume many of the aspects of a judicial tribunal without the necessity of either judicial training or legal learning—certainly often without much semblance of judicial restraint.

Another characteristic common to several states may be said to be the finality of the determination of questions of fact by the administrative triers of fact, an appeal to the courts being utterly ineffective except as to errors of law, or in some states for manifest fraud.

This characteristic of compensation laws you lawyers will recognize as an innovation in modern law. It is an ever-present help to the trier of the facts. He need not justify his belief in a certain set of alleged facts. If there be evidence, no matter how slight or how unreliable, his determination cannot be reviewed or overturned. If a claimant assert facts spelling accident and injury, if he assert that he told the boss or the foreman of an accident, if he make any assertion of a fact necessary to establish his claim, it may make no difference what witnesses appear to controvert his statements. His story may be wholly improbable, his unreliability may be apparent, yet his unconvincing story against all the world may be accepted and made the basis of an award of compensation . . . .

What then is the situation in which we find ourselves as the result of this conclusiveness of fact finding? Administrators and triers of facts are only human, they are motivated by the same human and humane considerations as are the general run of people. Often they are laymen and not lawyers. Sympathy may have full play when fact finding cannot be reviewed. So with every kind of motive and influence. The natural bent, the following of the line of least resistance, is encouraged by such a system. I once heard a commissioner say to an attorney, who pointed out glaring and decisive inconsistencies in a claimant's story, that this hearing is not the place to express disbelief in a claimant's story, and that to deny the claim he would have to find that the claimant had perjured himself. "If you don't like his story," said he, "go to the district attorney."

As Judge Kellogg remarked:[3] "the words of the evidence may make out a case; whether they are true or not."

It must be apparent to you, as lawyers, that such a system is open to grave abuse and may be made the vehicle for taking away one's property and giving it to another without just cause. Because we accept the system, does not mean that we must necessarily stand by without protest when the system is misused.

Conjoined with this conclusiveness of the findings of fact, are the presumptions in favor of the claim. These presumptions attach either by direct statutory provision or by judicial interpretation, and they carry very great weight,—often conclusive weight.

These presumptions have saved many a meritorious case from utter failure; doubtless too they have been the means of carrying over into the non-appealable realm of fact many cases of very questionable merit. The effect of them, of course, is to shift the whole burden of proof. Given the accident in the employment, the burden of proof then falls upon the employer to bring forward proof that the condition present was not the result of the injury, or that the disease that has become so severely disabling would not in fact have become disabling except for the accident. These and many other alleged facts become facts as a matter of law, without any affirmative proof of them on the part of the one asserting them.

Accustomed as we have grown to these presumptions, none the less, they stand out in sharp contrast to the principles of law applied and the requirements as to proof accruing from the early common law. Too often perhaps we are wont to voice

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* HENRY D. SAYER, Former Industrial Commissioner of the State of New York, Addressing American Bar Association, Section of Insurance Law, 57th Annual Meeting, Milwaukee, Wis., August, 1934.

1. *Southern Pacific Co. vs. Jensen*, 244 U. S., 205.

2. *Post vs. Burger & Gohlke*, 216 N. Y. 544.

3. *Benjamin vs. Rosenberg Bros.*, 180 App. Div. 234.

criticism of the administrators of compensation for what seems to us undue liberality to the injured worker, when really it is the presumptions in the law itself that we should blame.

Another point of general similarity in the several laws is the freedom from the restraining influence of formal rules of evidence. While inevitably the ordinary forms of evidentiary procedure will largely prevail, still we find both statutes and courts very liberal in letting down the bars to the receipt of evidence that would not for a moment be tolerated in an action at law or in equity. Hearsay evidence runs riot through our compensation hearings. And in New York, at least, we have a statutory provision that declarations of a deceased person may be received, if corroborated by circumstances.

It is perhaps but natural that there should ensue, in part a sequence of the foregoing, a broad general tendency on the part of the administrators of the law toward an increasing liberality in construction and application of the law. A similar tendency is evident in the courts which has supported the administrators in their interpretations and has led to much so-called judicial legislation of broad interpretation.

I think it is not open to serious dispute that no other law, in a like period of time, has been so greatly modified and extended by judicial interpretation as has the Workmen's Compensation Law . . . .

As an illustration of what we mean by judicial legislation or broad interpretation, we find the term "injury", where it is not limited in the statute to accidental injury, being defined as including occupational disease. And indeed a most recent decision in one of our states seems to hold that even where compensation is limited to "injury by accident" none the less asbestosis, acquired by inhalation of asbestos dust over a considerable period of time, is an accidental injury, rather than an occupational disease. The Supreme Court of North Carolina held that it did not seem to matter that, instead of suddenly inhaling a volume of air laden with poison, which unquestionably would be an accident, the claimant inhaled the dust of asbestos over a period of weeks or months. The court said: "but it does not seem that the time element should be paramount or controlling . . . Moreover, it would not seem that the unexpected, unforeseen, and therefore, accidental inhalation of deleterious matter could be deprived of its accidental quality by the mere consideration of whether it took five days or five months to procure the same result . . . It would seem manifest that our Act did not undertake to limit compensation to cases where the injury was begun and completed within narrow limits of time . . . "[4]

Thus, while the North Carolina law specifically and in terms excludes all occupational diseases, none the less one of the most controversial of all occupational diseases is in one wide gesture brought within the coverage of the law in that state by "broad interpretation."

Should this broad interpretation of North Carolina be accepted in other states, where the definitions are substantially the same, we would find that the whole category of dusty respiratory diseases, including silicosis, and the rest, besides asbestosis, would be brought within the coverage of the act, although in most of the states this class of diseases has been separately considered and rejected by the state legislatures. One immediate effect would be to impose upon employers and insurance carriers a liability that never was contemplated or intended, a liability so burdensome, in fact, that many companies could not stand the financial strain.

In another very recent decision[5] we see a classic example of what we may call judicial legislation. There the court actually inserted by its decision a word in the statute that was not put there by the legislature. In a certain section of the Illinois law relating to occupational diseases, there are distinct provisions relating to occupations where lead in its various forms is used, or brass or zinc. There then follow certain words of a very general character. The court in its opinion reads the section with the word "or", italicized and in parenthesis, inserted between the specific and the general, for otherwise, says the court, these general words are meaningless. And thereby the court has given meaning to the section far beyond what was supposed by many to have been the intention.

The court there said that if the legislative intention "can be collected from the statute, words may be modified, altered or supplied to obviate any repugnancy or inconsistency with such legislative intention."

As further illustrative of this definition by judicial interpretation, we find that courts and commissions hold the term "accident", (which we have understood to mean some mishap or untoward event, neither expected nor designed), under compensation may include deliberate and intended acts of third parties or a wilful assult.

"Accident" has also been held to mean a chill from going from a hot to a cold room, or a draft of cold air, sun stroke and frost bite. Likewise the contracting of ivy poisoning was held in one case to be an accident and analagous to the sting of a poisonous serpent concealed in the grass. In fact I have known of the court sustaining a finding that the bite of a mosquito in the place of employment, which became infected and was followed by a lung abscess, and eventual death from tuberculosis, was an accident within the meaning of the law, and the proximate cause of death, and was made the basis for an award of death benefits.

Very different these from the violent, sudden and immediately disabling accident that was brought to mind when the compensation law was first proposed.

The term "arising out of and in the course of" employment has likewise been the subject of widest construction and liberal interpretation.

An injury while playing baseball on a factory team under certain circumstances has been held to have arisen out of and in the course of employment. So too has been held an injury sustained when one employee went to a fellow employee to obtain a chew of tobacco. And the travelling salesman,—wherever he goes is in the course of his employment, and almost whatever he does arises out of it!

Time and your patience will not permit of running through all the decisions that have broadened out the compensation laws and liberalized them almost to a point of absurdity. These cases I have cited are sufficiently illustrative of the general trend.

In another, and to the lawyer, radical way, we find a somewhat common trend in compensation. I refer to the provisions by which, in some states, my own included, administrative or quasi-judicial tribunals are given continuing jurisdiction over a claim. In this respect compensation law is very unlike the older forms of law.

Compensation is paid periodically, as it comes due, more or less in like manner as wages, either by agreement or voluntary act of the parties within the law, or by a series of orders and awards issued by the administrative authority. Corrections or modifications may be made as time goes on, rates may be changed, if found to be incorrect, disabilities may be reclassified as conditions change, compensation may be terminated and may again by reason of error or change in conditions, be reinstated. Settlements may be paid in lump sums with the approval of the administrative authority, and even then the claims often times may be reopened and payments ordered resumed. The time within which such reopenings may be had, and the conditions under which jurisdiction may be reasserted vary in the different states. But in the unlimited laws, jurisdiction may be practically unending during the lifetime of the injured employee, and of his dependents, after death.

SUCH broad jurisdiction and such power to correct wrong, to protect an injured worker against his own improvident act or ill considered determination, is a characteristic of the compensation system, that distinguishes it from all our previous forms of jurisprudence.

At the same time we must recognize the possibilities of abuse inherent in such a system. The old familiar aphorism that "you may not eat your cake and have it also", does not necessarily hold true under such a system. Settlements may be made that seemingly are final, have the form of finality, and yet may be far from final.

To illustrate, I have in mind a case wherein, after a short period of physical disability, following a very minor injury, there developed a mental or nervous disability, which was compensated after a year by a so-called lump sum final settlement. After a time, following settle-

4. *McNeeley v. Carolina Asbestos Co.*, decided at the Spring Term, 1934, N. C. Supreme Court.

5. *Burns v. Industrial Commission*, decided by the Illinois Supreme Court, June 15, 1934.

ment, the injured man returned and complained he had not received adequate compensation and was still disabled. The case was reopened; further compensation was awarded up to the full limit for temporary disability; the case was then reclassified upon a medical opinion and an award made as for a permanent total disability. Compensation has been paid in that case ever since, a period of more than 12 years, with a prospect of a lifetime of compensation still in the future. An injury, trivial in itself, has thus become a major liability of the employer and his insurance carrier. Such cases, to a lesser degree, may be multiplied many times in our experience, in some jurisdictions.

An inevitable consequence of such a system is the practical difficulty of determining with accuracy the liabilities of an employer for injuries to his employees. It may seem that his liabilities have been paid and all closed out, when, in fact, by reopening claims, the liabilities may continue far into the future.

This, of course, has a far reaching effect on premium rates, and from the viewpoint of employers and insurance carriers, this is one of the most disturbing elements or realities of the compensation system.

We have thus endeavored to visualize some of the more common characteristics of the compensation system, as it exists in many of our states. We have seen how it stands on our statute books.

But statute books do not tell the whole story of the realities. What has been written into the law by interpretations and construction?

First and foremost, I think we may say the outstanding rule in the application of compensation laws is liberality,—liberality in statutory construction and liberality in administration.

Some of the reasons for this liberal view are not difficult to find. They are quite natural and inevitable, because inherent in the system. And liberality within a rule of reason is not at all repugnant to industry nor to the great majority of our people.

The statute is a beneficial one, that is, one enacted for the benefit of certain classes of our people or in advancement of the public welfare. And beneficial statutes are invariably liberally regarded and construed.

A great student and authority on compensation, Former Commissioner Hobbs, of Massachusetts, after an exhaustive review of the authorities in all of the states, has expressed this liberal tendency in a very succinct and terse way.

Referring to the attitude of the courts, in compensation cases, he said:[6]

"Statutes remedial in character or enacted in the interest of the public welfare are given what is known as liberal, equitable or reasonable construction, designed to carry out the intent of the law. So far as the language will permit, and perhaps a trifle beyond, it will be construed to this end, though the court will not undertake to rewrite the statute in any substantial degree."

In considering this tendency, let us not forget that the compensation system was brought into existence as a result of widespread distrust of the relations between employer and employee, and a general dissatisfaction with the old forms of law applicable to them. Grave abuses growing out of that old order caused the pendulum to swing to the other side. And when the pendulum swings it is very apt to swing far, as it has done here.

Then too we must not overlook the character of the system. It is a broad social, rather than legal system. It strikes at the need and the hardship brought about by the industrial accident, which is so often preventable. The administrator of the law, in these circumstances, will quite inevitably acquire the social viewpoint, if indeed he did not already have it quite highly developed.

Once the social, as distinguished from the legal, viewpoint is conceded, the social and economic need of relief becomes the vehicle by which pure workmen's compensation becomes transformed into other forms of social relief,—sick relief, old age relief, and unemployment security.

So softly settles the twilight in this hour between social need and legal relief that it becomes difficult, often well nigh impossible, clearly to distinguish the line of demarcation between them; and it is still more difficult to act impartially when the line is faintly discernible.

For example, we find a man of advanced years, say, 70 years old, doing work of a type for which he may seem fitted. He has the hardening of the arteries not unusual at his age. He meets with an accident; the injury is trivial, judged by the effect it would have upon a younger man;—perhaps a slight back strain or a mild head injury, or a wrench of the elbow. This injury, let us say, causes a couple of weeks of real disability, after which time its visible and objective effects have all cleared up. But the injury did something else. It interrupted an otherwise continuous course of employment up to that time. It punctuated his working habit, perhaps with a comma, more likely with a period. This man does not return to work. Assume that he would have had to stop work within a few months in any event, because of his advancing years;—his race done.

What now shall we do with him under compensation? When does the light of compensation fade into the dark night of old age incapacity? Who can say? But the statutory presumptions come to the aid of the administrator, and the compensation benefit becomes the old age security.

Or again, the injured worker is certified by a physician as being able to do regular work. He insists he is unable to work, and supports his claim with some sort of medical testimony, which may or may not be expert or even honest. The Commissioner orders that he try to do some sort of work. A month or so later he returns, says he tried to find work but nobody will hire him, a weak or partially crippled worker. Compensation will be ordered for him almost certainly. If work were plenty, wages good, this man would not be back for compensation, he would be working. And again, it is difficult to pierce the twilight between compensation and unemployment relief. The legal presumptions and the liberal interpretation make the social relief here justifiable under the compensation system.

But let us turn to another aspect of the workmen's compensation system. Let us examine the relationship of the medical profession to this legal system.

The administration of any compensation law depends in most important part upon the determination of medical questions. Every injury that ever gave rise to a compensation claim, and every occupational disease, has required medical treatment or diagnosis at some time. Therefore, the doctor enters every case. From the industrial and social side, there is treatment and rehabilitation to be given. From the administrative side, there is diagnosis to be made; disability to be determined, and casual relationship between accident and disability to be established, as a basis for compensation.

In words it sounds so simple; in practice it is often so difficult. In obscure cases, the diagnosis is often hard to make satisfactorily, and without it we cannot tell whether the resulting disability or death is related to an accident. A case in point, to illustrate simply; a man is working and is seen to fall to the floor. An object over which he might have stumbled is found nearby: 12 hours later he dies and at autopsy hemorrhage in the brain is found. Three possibilities, at least, present themselves in this particular case. Did he have a slow apoplexy that began before the fall, and that caused the man to fall? Did he have a syncope or an epileptic seizure that caused him to fall, and the fall bring on the hemorrhage? Or did he stumble and fall over the nearby object and did the hemorrhage and subsequent death follow naturally and unavoidably from this simple industrial accident? The answer lies in the correct diagnosis, but when, as in the cited case, there is some evidence on each point, even diagnosis becomes a baffling problem. Moreover, here the presumptions do not come into play, since the courts have held, at least in some jurisdictions, that the presumptions do not lie until an accident is established, and the accident may not be presumed. It must be established by legal evidence.

THE next class of medical questions relates to casual relationship between accident and disability or death. The question of diagnosis here too enters, for we cannot accurately determine casual relation unless we correctly know the condition with which we are called upon to deal.

In this class of cases, the presumptions of the law play the most important part. For when all the experts have learnedly, or otherwise, discussed the matter, and debated medical questions pro and con, and the trier of facts has become com-

[6] *Proceedings of the Casualty Actuarial Society*, May, 1932, p. 272.

pletely befuddled and confused, he may safely pin his faith upon the presumption that, a compensable accident having occurred, the claim is deemed to come within the law, in the absence of substantial evidence to the contrary. And the question of fact having been determined on some evidence, it will not be disturbed by the courts even though it be altogether against the weight of the evidence.

In this class of cases fall the innumerable doubtful claims based upon the effect of trauma or external violence in some degree upon pneumonias, tuberculosis, cancer, heart conditions, arthritis, and nearly every other condition to which mortal flesh is heir. It is not too much to say, perhaps, that in this large class of cases, compensation has developed a certain limited type of sickness relief.

We have seen how the definition of accident has been enlarged by judicial interpretation, so that it bears little resemblance to the accident that was in all of our minds when the compensation laws were first enacted.

But the courts are not alone responsible for the enlargement. The doctor must also must take his full share of responsibility for carrying compensation far beyond its original conception. Aggravation, activation, lighting up and exacerbation of disease, lowering of resistance to chronic disease, all are familiar terms to us in compensation. They now excite no resentment, inspire few appeals to the courts, are more or less accepted as a regular part of the system. Yet we do not have to go back much more than a dozen years to find these medical theories first being exploited.

WHAT do we understand by these terms which will not be found in the statutes, which have been written in by the medical profession, supported by the courts?

We now understand that if a man has an old arthritis, due to natural causes, and meets with an accident, ever so trivial, and it can be said with a fair degree of plausibility that the condition was aggravated by the injury, the subsequent disability from arthritis will be compensated the same as a disability due directly and solely to the accidental injury. How many thousands of arthritic backs or joints have been compensated because of an intervening injury which supposedly has aggravated the condition? And how many thousands more of them will there be as time goes on? Who can say?

How many cases of tuberculosis of the lungs, spine, joints or other organs of the body have been held to be compensable because of a lesion that once existed in the body but has been dormant, quiescent, healed, and then is alleged to have been reactivated or lighted up by an accidental injury that would have caused no disability whatsoever in the person of another who was free of any such old condition?

How many persons, harboring within their bodies the germs of some insidious disease, have, through a blow causing a bruise or contusion, developed an infection or disease, perhaps permanently disabling or even fatal, and have been held entitled to compensation through the theory of lowered resistance?

This theory is that if, following a trauma, or blow, we get a contusion or other damage to a body tissue, that tissue becomes congested, inflamed, less resistant to disease, that then the germs of the disease flowing in the blood stream invade this place of lowered resistance, this area of congestion, and, in time, local infection or other manifestation of disease occurs. This is often seen in individuals in the tertiary stage of syphilis, who, after an accident that would not be disabling to an otherwise healthy individual, develop all the chain of terrible results of that dread disease. These conditions may then be judicially held to be the natural and unavoidable sequence of an industrial accident, for which the employer pays.

How many cases of cancer have been held to be the basis for compensation when an accidental injury is shown to have occurred at some time in the progress of the disease? Chronic nephritis, diabetes, myocarditis and endocarditis, arteriosclerosis or hardening of the arteries, high blood pressure, cerebral hemorrhage, paralysis, and many other diseases are frequently found in compensation cases. And to add to the list, not least, even though mentioned last, we have the terrible consequences following upon accidents, where the only effect has been to the nervous system. Psycho-neurosis, traumatic neurosis (which was sometimes revealed to the old liability courts as "railroad spine"), hysteria, conversion hysteria, and shaking palsy all are found in too frequent numbers in compensation. The neurotic hypochondriac is always a pitiable object. But let him meet with an accident in his employment, from then on the employer or insurance company will take care of him, not always too willingly, but none the less certainly. And curiously, in many of these cases, the slighter the injury the greater the after effects in the way of hysteria. The serious accident doesn't cause these results, but the minor bump or even nervous shock or fright is sometimes followed with unfortunate and dire results.

Insanity even may supervene at some time, and that too may be the basis of an award of compensation. And then too, notwithstanding that suicide is generally expressly excluded under the law as a basis for compensation death benefits, yet when it is fairly demonstrated to be the end result of nervous shock or worry due to an accident or the act of an insane person, following an accident, suicide will be, and quite frequently has been, compensated by an award of death benefits.

The third very important relation of the doctor to compensation is in the determination and evaluation of disabilities. This field calls forth not alone the physician's knowledge of medicine, but also his understanding of human nature, his imaginativeness, his honesty and fairness. Disabilities group themselves into four major classifications, first, permanent total disability, which, as the term implies, is total disability for earning, and is permanent in character. Second, temporary total disability. This is by far the most numerous and frequently met disability. It implies a total inability to work, for a temporary period, be it short or be it very long drawn out. This frequently is followed by temporary partial disability, which occurs when the injured person has so far recovered as to have a partial earning capacity, and precedes sometimes the return to full wage earning work. The fourth is permanent partial disability. This class relates to the so-called schedule losses and includes the dismemberments and joint changes. The loss of the finger, hand, foot, leg or eye is certainly permanent in character, but is not totally disabling. In fact, in a large percentage of such cases, there is an eventual return to work at the regular wage rate. Generally speaking, the question of wage or ability to work does not enter into the determination of such disabilities. The schedule loss may be an amputated finger, or 25% loss of use of the foot or some other whole or fractional loss of a member. The degree of such loss, when it is not clearly entire, becomes a medical question not without its difficulties. There are no uniform standards for such determination; there is no statutory yardstick by which to measure the partial loss or loss of use of a hand or foot. The doctor gives his opinion and by that the administrator must largely be guided. Sometimes we have different medical opinions on the same case, and they may vary as widely as the poles. I have seen a condition estimated by one doctor as 20% of a member and by another as 75 to 80%. Surely both cannot be right; there can be no logical excuse for such a variance, if both physicians apply the same relative standards. Probably, in fact, neither is right. Often we find the administrator taking the two opinions, and, as they say, splitting the difference between them. This method is neither satisfactory nor fair to either party. It is, I fear, too often submitted to by the employer or insurance carrier for reasons of expediency.

But, when in all these questions we consider the finality and conclusiveness of the administrator's findings of fact, we realize just how far we have gone down the line of such informal procedure.

The question of whether any disability exists or not, whether the injured person has something or has nothing, whether the purely subjective complaint of pain in the back is real, whether some or no earning capacity exists, whether the extent of loss of use of a member is properly set forth, whether the schedule loss has been increased or partially added to by a prior or subsequent accident, are all questions of fact and cannot be reviewed by the courts if there be any evidence to sustain them, and in the absence of gross fraud.

One result is that there are few appeals to the courts now where the question is one of medical fact; an appeal would be futile. The practical effect is that the say-so of

the doctor, particularly if he is the official state examiner or so-called impartial, is the final word as to what the employer or carrier shall pay or what the claimant shall receive.

Does such a system lend itself to sharp practice; to cheating of the claimant, to malingering and fraud against the employer? Perhaps. Is it the responsibility of the bench and bar to be ever watchful of this new system? I think so.

May I, at this point, interject to say that I would not be thought to be a critic of the compensation system. On the contrary, I firmly believe that the present system of compensating the worker for loss of earnings or earning capacity resulting from industrial accident or occupational disease is the most progressive and wholesome development in our industrial system during this generation.

It marks an immeasurable advance over the old common law of master and servant or the so-called employers' liability laws, particularly as they had come to be applied in the years immediately preceding the adoption of compensation. In the application of those laws a premium came to be placed on sharp practices, chicanery and collusion. Delays were the common rule, unless settlement could be quickly arranged. Quick settlements, however, were not the guarantors of adequate settlement. Many a person has signed away valuable rights for a fraction of their worth under the stress of dire need. "Justice delayed is Justice denied" came to be an expression of the common belief as to the old system.

And then too, there were many thousands of cases where no relief could be granted to the injured or crippled worker, whose only fault was that the inexorable law of modern civilization compelled him to sell his labor in the only market available to him. True, the individual employer was not at fault; he had committed no wrong toward his worker for which he could be held to answer in damages.

But the newer concept,—the truer concept,—is that, not the employer but rather that industry itself is the real party in fault. Under the compensation system, as component parts of that industry, each employer contributes to the funds out of which the injured worker or the dependents of the deceased worker, are compensated. These contributions or insurance premiums paid in advance of an accident provide both the protection to the worker and the legal relief of the employer.

In changing from the old system to the new, the employers and the workers exchanged a legal game of tag for an orderly, certain and prompt system of payments to injured workers. The worker gave up his right to sue for damages, a questionable and speculative right to big damages where the employer alone was at fault,—and in its place accepted a limited but certain and universal right to compensation.

As we have seen, this right attaches by reason of the contract of hire; the employer cannot escape it, the worker cannot reject it. The remedy is summary, it is speedy, it is informal. It presents itself at the hour of greatest need, namely, when the breadwinner of the family is bringing in no wages because of accident. This relief does not come, as the old rule was, after months or maybe years of delay and litigation, when perhaps the real need or relief has departed. It comes promptly after the accident and continues weekly or periodically during the resultant disability, until wage earning power has been re-established.

Can anyone, viewing the many benefits of the law, contemplating the many millions of dollars flowing annually from industry into the hands of the industrial cripples and victims, doubt the complete efficacy of such a system? I think not.

Great as are the monetary benefits to the workers, I sometimes think that they are surpassed by the reparative features of the law, in the way of medical treatments and vocational training for the industrially handicapped.

One of the distinguishing features of the system is the requirement that the employer shall promptly provide adequate medical treatment for the injured worker. Not so under the old system. After first aid,—and not always that,—the injured worker was formerly allowed to drift and provide his own medical treatment. Actually, then a huge part of the industrial burden of medical care was shunted over on to the shoulders of the medical profession and of the workers themselves.

Perhaps the doctor got paid a few dollars as and when the worker was able to pay, or when he recovered damages. More often the worker sought treatment at public hospitals or dispensaries, where the treatment was free,—and too often worth just about what it cost the worker!

Today the employer has learned that poor medical service inevitably results in high compensation cost; bad medical results have to be paid for in compensation. It did not take long for the medical profession to respond to this stimulus, and more attention came to be paid to the end result of treatment. The effect of all this has been, not only that millions of dollars are now being paid yearly to the doctors and to hospitals for medical service, but vast improvements have come about in the field of industrial medicine and surgery. The average workman of today is better cared for, when injured, than his employer could have been 20 years ago. And all at the cost of industry itself.

The importance of physical and vocational rehabilitation likewise came to be recognized with the better understanding of compensation.

The skilled worker, whose work at his trade has been ended by reason of a permanently disabling injury to a hand or finger or foot, or whose ability to work on elevated structures or in high places has ceased by reason of dizziness or lack of confidence in himself following a head injury, is now taken in hand by either public or private agencies, and is re-educated to work, either at his old trade or at a new trade or occupation for which he is fitted. Thus great and often successful efforts are being made to reclaim much of the industrial human wastage that follows in the wake of industrial accidents. In fact, instances have been found where the vocational trainee has by training and re-education been enabled to earn higher wages at some new trade.

Nor shall we overlook the tremendous stimulus that compensation has become in the field of accident prevention. When it was found that every accident cost money, regardless of whose fault it was, then industry awoke with a start to the necessity of accident prevention. Safety is not merely humane; it is utilitarian. An employer or factory manager, who may not be reached through the heart may be reached through the pocket book. One immediate effect of compensation was the reporting of all accidents. This data, when statistically analyzed, showed the causes and effects of accidents, called attention not alone to the suffering entailed but also to the dollar cost to industry. It showed how many accidents were preventable. Compensation gave rise to safety engineering as a profession.

Measures of all kinds have been devised to reduce the number of accidents. Safety education is now the rule in industry, machine safeguards are practically everywhere required. Inducements to safety are extended by insurance companies by way of credits on premiums, and excess charges are imposed for failure to regard safety requirements.

When we see the continuing huge totals of accidents still occurring, we sometimes wonder if this safety and accident prevention work is worth all it has been represented to be. I believe it is, and I believe further that if we had not done what we have in this field, accidents would have been so many, compensation might have become so burdensome, that the risk would have become uninsurable and industry would have broken down.

The increasing mechanization of industry has unquestionably increased its potentiality for accidents. The warfare against the preventable accident must and will go on so long as the system of compensating for industrial accidents continues.

The adoption of the compensation system abated many of the old abuses and hardships that existed under the common law and employers liability laws. The most objectionable features of the old system immediately disappeared. The new system was not confided to the legal profession to guard and to fend; it was largely confided to laymen, and to socially minded people. The worker, in a very real sense became the ward of the state.

THE legal profession received the compensation system either with resentment or with indifference. Many lawyers were irritated by the lack of cordiality toward their profession on the part of the new laws' administrators; they seemed to be unwelcome, attorneys' fees were usually fixed by the administrative authority, and fixed at amounts that many regarded as most unjust. Since lawyers could not collect fair fees in

the compensation field, why should the profession have any regard for such a law? Why should the law schools include in their curricula a branch of law that no lawyer would wish to take up as a means of making a livelihood? Why should lawyers' organizations and bar associations devote time and special study to a sort of jurisprudence that was anathema to so many of their members?

Their lack of keen interest was easily understandable; there were few points of contact, and the invitations to cooperate were not many.

Did we in all this fail to discern that the beginning of the compensation system marked a new era in our forms of law and procedure; did we fail to see that the social point of view and the social need were to become the generally accepted standards in all our contacts between government and the people, as well as between employer and employee?

Are we now prepared to recognize compensation as the tried and accepted method of dealing with industrial injuries and diseases? Do we realize that it is an important and integral part of our governmental and judicial machinery? If so, and it seems to me we must, then let the lawyers take it more largely into their thoughts, let them assume that leadership and continuing interest that they have assumed so well in other fields of law.

We have not viewed the whole field. To do so would take far more time than could be allotted to me for this discussion. It would go into an intricate maze of technicality, which is not my purpose. But we have looked in, as it were, through the half open door, and have seen some of the high lights and some of the realities of compensation.

What thought does it inspire; what purpose does it arouse? To us, in the compensation field; to you, members of the great profession that has ever stood as the champions of human rights and sound government, there comes a challenge,—a challenge to learn more of, to share to a greater extent in the great field of industrial and legal jurisprudence that this generation has brought into being; to assume some of the burden of responsibility for the shaping of this system of jurisprudence that has now long since passed the stage of experiment.

Perhaps, as many insist, there has come over our consciousness a new conception of government in law, and judicial application of the law by administrative individuals and boards. But let us be sure that such is the majority opinion, and let us be sure that in the new conception we do not defeat the very purpose that is sought. This growing tendency seems to have been observed by the special committee on administrative law of this association. In its report to this convention the committee has pointed out that the judicial branch of the Federal government is being rapidly and seriously undermined and the way being opened to the easy nullification of the rights of the individual by the absorption of the judicial power by administrative agencies of the government.

There is evident a further extension of the limitations on the right of appeal on questions of fact. More and more, it seems, administrative officers clothed with certain judicial functions are freed from review on the weight of the evidence, or on any issue other than a question of law.

In the language of the Committee, "Administrative tribunals with judicial powers are courts in fact; without adequate judicial review of their decisions they are, potentially at least, courts controlled by the executive or by the legislature."

Do we wish by legislative enactment or by judicial construction to enlarge or expand this administrative control of judicial matters? Is it a healthy tendency for the good of the compensation system itself? Is there danger that the very trend toward excessive liberality may defeat the very humane and beneficent purposes of the law?

I ask the questions; I do not attempt the answer. Rather, it seems to me, the answer lies with trained legal minds of the country. I believe this Association has a large responsibility and duty in answering these questions.

Particularly important, it seems to me, is it for the Bar Association to take up the matter in view of the present day agitation in many places for compulsory automobile insurance laws to be administered and patterned after the manner of our workmen's compensation laws.

Perhaps the coming generation will insist that the man who is too old or too infirm to work shall be taken care of by the industry of which he was long a part. Perhaps industry will be obliged to provide for those who cannot find gainful employment to maintain themselves and those dependent on them.

Perhaps industry will have to make adequate provision for the care of the industrial worker who by reason of ill health is unable to care for himself. These things are not mere fantasies; they are logical consequences of what is going on in business and government today. But are we entirely just when we permit these things to go on in industry for the industrial worker, while denying them to the person who is not industrially employed? And are we fair to the industry, that, after all, must pay the bill? Is it right and fair, by administrative ruling and interpretation, to take the employer's compensation dollar and try to make it cover both compensation for accidental injuries and also sick insurance, old age pensions and unemployment benefits all at the same time? It requires scarcely a moment's thought to realize that it cannot be done. The compensation premium dollar represents the cost to industry of industrial accidents, determined by actual statistical study and experience over a number of years. It is not computed to bear the cost of these other social obligations.

This cost cannot, as at present constituted stand these added burdens. What then will be the result? Either the system itself will break down utterly and fail, bankrupting those who are compelled to pay out of the dollar more than is in it, or else the system will have to be revised and entirely reconstructed. If we are to have health insurance, let us have it directly, not by indirection. If old age security is the desired end, let us provide for it in definite statute, —not load it on where it does not belong. If unemployment insurance, or reserves, or the dole, is to occupy a permanent place in our social legislation, let us intelligently plan it and definitely provide it.

All plans for legislation along these lines must provide the means and methods to carry them into effect. Is industry alone to bear the burden of cost? Can it do so and not run the risk of entirely breaking down?

It should be self-evident that more cannot be taken out of industry than is put into it or developed by it. If we try to do so, I fear that we shall succeed only in destroying or jeopardizing that which we should encourage and foster. Let us not bring ultimate distress where we thought only to bring relief.

Moveover, it seems to me that in planning any new movements of a social and industrial nature, great care should be exercised to avoid the lack of uniformity so evident in our compensation laws. Let not a system of humane justice to individuals become, through lack of uniformity, an instrument of discrimination between communities or states. If it be that a larger social and economic system is in the making, if the compensation system is about to be expanded into a wide system of social welfare, let us avoid so far as possible extending the apparent discriminations that have thus far crept into our industrial system.

Florida Adopts Compensation

FLORIDA, after years of consideration, has finally passed a Workmen's Compensation Law. It becomes the forty-fifth state with a compensation act; there are now only three states in which injured employees must depend on the common law for recovery. The Florida bill exempts farm, saw mill, turpentine and white collar workers and is applicable to all employers of four or more employees. No compensation is allowed for the first seven days of the disability, except that the employer shall furnish medical, surgical and other attendant or remedial treatment. In case the injury results in disability of more than 29 days, compensation is allowed from the date of disability. No claim for legal services shall be valid unless approved by the Commission or by the courts on review. Every employer shall secure payment of compensation by insuring and keeping insured with any stock or mutual company or association or exchange authorized to do business in Florida, or by furnishing satisfactory proof to the Commission of his financial ability and receiving authorization from the Commission to pay such compensation directly.

THE BULLETIN

of

The American Association of Industrial Physicians and Surgeons

THE object of this Association shall be to foster the study and discussion of the problems peculiar to the practice of industrial medicine and surgery; to develop methods adapted to the conservation of health among workers in the industries; to promote a more general understanding of the purposes and results of the medical care of employees, and to unite into one organization members of the medical profession specializing in industrial medicine and surgery for the mutual advancement in the practice of their profession.

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Secretary-Treasurer, Chicago

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President's Address

By EDWARD C. HOLMBLAD, M.D.*

IT HAS been my pleasure to have been affiliated with this Association since 1926, during which time I have had the opportunity of hearing some splendid presidential addresses. In reviewing these recently I wish I could combine the industrial physician's viewpoint of Dr. Sawyer with the late Dr. Keifer's understanding of its relationship to the public health of the community. Were I endowed with Dr. Lowe's ability of analysis, Dr. Schram's insight into the future, and Dr. Watson's able diction and art of expression, I might then hope to give you the address you deserve.

Lacking these qualifications, I have deemed it advisable to call to your attention some of my personal observations and thoughts relative to certain phases of the industrial physicians' and surgeons' problems.

This Association has been one of the best means of initiating open forums, discussions, and exchanges of thoughts regarding industrial medical problems. Many of the topics of present day meetings were discussed by this Association many years ago. To mention a few, there are the value of physical examinations, hygienic conditions and sanitary inspections, rehabilitation, health of workers, benefit associations, medical departments, etc.

During the past 15 years I have had the opportunity of observing the trend of cases that have come before some industrial commissions for disposition. The lack of uniformity in state laws is one of the deplorable situations in this field; may we all strive to encourage and foster as best we can uniform state laws and practices, as regards our various industrial commissions. Most unfortunate are those provisions limiting the amount of medical and hospital care in a given case to $150 or $250, after which the patient must look out for himself. Certainly, the injured employee is entitled to all reasonable medical and hospital expense to restore him to the best possible health and recovery. Many of our large corporations, and even some of our insurance companies, have gone far beyond their legal requirements because they recognize a moral obligation.

It must be remembered that insurance rates for workmen's compensation cases are based upon legal obligations in the state; not upon moral obligations nor the wishes of the employer to provide and compensate his employee for injury. In this connection I cannot help but mention that we quite frequently observe an effort of an employer to conspire with his employee in making the insurance carrier responsible for some condition which did not occur on duty or arise out of and in the course of his or her employment. Such employers display their ignorance, because they fail to realize that their insurance rates are based upon their experience, and eventually they themselves are the ones that have to pay the bill.

There is a similar trend in the conduct of some of our industrial boards in awarding disabilities and compensation beyond all reasonable casual relationship. This manifests itself and is subject to greater abuse in determining the aggravation of pre-existing disease condition, than where it is solely a question of some condition due alone to injury. Take, for instance, the middle-aged to elderly employee with an osteo arthritis of his back, disabled as a result of some slight lifting effort of say 10 or 20 pounds. It is even possible that at the time of this minor lifting effort x-rays demonstrate the presence of plainly visualized spurring and osteo arthritis positively antedating the lifting effort. Yet such cases are frequently awarded total permanent disability, and industry is made to carry the entire burden of this patient's disability, a large part of which was due to pre-existing disease. There is only one place where this money so awarded can come from, and that is in the ultimate cost of the finished product which the consumer pays in his purchase price. Certainly, in justice to the consumer he should only be charged with the rightfully attributable injury costs.

Another common diseased condition wrongfully charged completely to industry is the death and disability due to arterial hypertension with high blood pressure, and the results of diseased arterial and circulatory systems, such as cardiac failure, cerebral hemorrhage, etc.

The natural result of this state of affairs is one in which employers examine their employees on admission to employment and frequently re-examine them for purposes of determining their physical condition.

* Twentieth Annual Meeting of The American Association of Industrial Physicians and Surgeons, Philadelphia, Pa., June 10-11, 1935.

Naturally, there are many who cannot be employed.

In due fairness to many large industries, many have seen the light and are far ahead of the times. Such large industries have established systems for proper placement of employees, putting their cardiacs at suitable classes of work and placing their high blood pressure cases in safe surroundings, and even in many instances provided hospital and medical care for their employees so that they may treat and remedy diseased conditions early that have no bearing or casual connection with their employment whatsoever. These activities are to be highly commended. They are usually only available to employees who have fixed employment or long service with one company.

On the other hand, take the great mass of employees who only work a short time for one employer, such as in the building trades, general laborers, and with industries having a wide fluctuation in activity. Such employees are unable to find employment, being turned down for employment wherever they may go.

Take for example a young man of 27 years of age with a blood pressure of 220 to 230 systolic, who has been married one or two years, and whose wife expects to present him with a child in the near future. Where is he to find employment, and how can any employer hire him under our present system without extensive, unreasonable, and unfair hazard. Yet, one would feel he has a right to earn a living, and it is to this problem that I am calling your attention this morning. Is it not possible that the inadequacies of our present systems are creating a class or group of individuals handicapped by some disease or injury so that they cannot earn a living? As far as injuries are concerned, many states have already worked out systems whereby an employer can safely employ a man with one eye, one arm, or one leg, without being burdened with extra hazard. In most of these cases some state fund provides the extra compensation in case these handicapped are further injured.

I offer for your thought and consideration a tenative plan that might be developed. Would it not be possible to have a neutral medical body or board examine this class of handicapped individuals and give them some sort of a disability rating due to their disease or handicap? Thereafter it would be possible for an employer to hire a man, accepting only the hazard of disability above his rating.

Take our young man with the high blood pressure again. Suppose after careful examination, including kidney function and effort as well as fatigue tests, this neutral medical body gave him a disability rating of 75% of a total permanent disability. Any employer could then hire him and provide him with work and only be charged with 25% of a total permanent disability hazard in the event he developed a cerebral hemorrhage or uremic convulsion while on duty.

Again you see that many large employers of labor have already met this problem for their employees by properly placing them at suitable work, and by providing medical and hospital care; and that, through employee benefit associations and pension plans, they have anticipated the time of disability. It is for the large numbers of employees without these advantages that I hope we can aid in developing something advantageous.

There is a trend in another direction that might offer some relief. I cannot mention it without concern because I, personally, feel it is placing an unfair expense and burden on the consumer. This trend is that in which our workmen's compensation rates will be continuously raised to such a level that workmen's compensation insurance can cover all employee disability, whether due to accident or disease.

When we realize that for accident coverage alone on a recent caisson job the workmen's compensation insurance rate was 65% of the payroll, then we hesitate to think of the possible rate necessary to cover both accident and disease disabilities.

I hope I have not burdened you with too much detail, and that my thoughts are worthy of your considerations.

Twentieth Annual Meeting June 10-11, 1935

THE Officers and Directors elected are as named under "The Bulletin" heading on the preceding page. The reports of the Secretary-Treasurer were approved as follows:

Secretary's Report

Membership, June 9th, 1934		318
Applications accepted and approved		9
Total		327
Resignations	11	
Deaths	4	
Dropped, non-payment of dues	55	
Total		70
Membership, June 6th, 1935		257

Fellows, 56; Members, 201; Honorary Members, 16.

Treasurer's Report

Receipts: Balance on hand, June 9th, 1934		$ 774.82
Dues and applications		885.00
Interest (savings deposit)		3.67
Total		$1,663.49
Disbursements: Office expense (stationery, stamps, rent, etc.)		$ 275.64
Clerical expense		390.00
Publication (**Industrial Medicine**)		245.75
Annual Meeting expense		95.66
Miscellaneous		27.82
Total		$1,034.87
Balance on hand, June 6th, 1935		628.62
Total		$1,663.49

THE following applicants for membership were elected to membership:

DR. ARLIE L. BROOKS, Fisher Body Corp., Detroit, Mich.

DR. JOSEPH A. SANFORD, E. I. Du Pont de Nemours & Co., South Milwaukee, Wis.

DR. J. A. SIMPSON, U. S. Fidelity & Guarantee Co., Laredo, Texas.

DR. H. P. COLE, Southern Railway, Mobile, Ala.

DR. J. NORMAN WHITE, Glen Alden Coal Co., Scranton, Pa.

THE amendment to the Constitution providing for the election of a President-Elect was adopted.

The amendments to the Constitution and By-Laws providing for the election of Associate Members, who would pay no dues, were defeated.

The amendment to the Constitution providing that Vice-Presidents should be elected, one from the membership east and one from the membership west of the Mississippi was defeated.

Industrial Medicine and Medical Ethics

The Work of the Medical Department of the Chesapeake and Potomac Telephone Company

By WILLIAM CABELL MOORE, M.D.*

Medical Director, Chesapeake & Potomac Telephone Company

A NEW situation has arisen in the practice of medicine since the enactment of the legislation known as the "Workmen's Compensation Act." This situation has made it necessary for some industries to employ physicians to assist in handling various medical problems that have come up as a result of this law, and has directly affected physicians in their relations with one another and with their patients where industry is concerned.

There is nothing in the old system of what is termed "medical ethics" that refers specifically to industrial medicine, but the underlying principles of "medical ethics" are the same always, and these underlying principles must be applied to new when new conditions arise.

It is proposed, therefore, to describe briefly the work of the Medical Department of the Telephone Company, one of our large industries, and to consider the application of these underlying principles to conditions affecting physicians serving this industry and physicians attending employees of this industry in their relations with each other and with the industry and with the employees.

Definition of Medical Ethics

ETHICS has been defined as the science of human duty. It relates to customs and manners, and to what is properly due from one person to another in their association with each other. And the prin-

* Read before the Medical Society, January 16, 1935, and published in the *Medical Annals of the District of Columbia*, Vol. IV, No. 3, March, 1935.

ciples of medical ethics are a series of regulations adopted from time to time defining the duties of physicians to each other, to their patients and to the public, and the obligations of patients to their physicians. These principles are the basic principles of right action for physicians in all their professional activities, and their application, as I see it, implies that physicians should always do what is right and decent and honest in their relations with each other, with their patients and with the public.

The Workmen's Compensation Act

PRIOR to 1910 laws had only remotely and indirectly affected the relations between employers and employees so far as health was concerned, and with few exceptions employers had done little to improve the health and working conditions of their employees. But since 1910 the situation has changed materially, for just prior to 1910 was enacted in this country the first of the laws known as the workmen's compensation act, a law which with modifications has since been adopted in every state in the Union and which has exerted a profound influence upon the health and safety movement in industry, and directly affected the relations between employers and employees. This law compels the employer to bear all the expenses incidental to an employee's recovery from an accident arising out of and in the course of employment and from occupational disease and to pay compensation in case of death or loss of limb as a result of employment. The law also compels the employer to carry compensation insurance or to be self-insured for the better protection of his employees.

Effect on Employers

NATURALLY, this law stimulated employers to take an unusual interest in accident prevention, and the relationship between poor health and accidents and good health and safety was quickly recognized.

Effect on Physicians

THE law also affects physicians indirectly, for some of the employees of industry soon began to take advatage of the opportunity afforded by this law to pretend disability when there was none and to prolong unduly time lost on account of disability and thus obtain money dishonestly from their employers or from insurance companies. This the employee could do only with the approval and assistance of the physician who was attending him. Sometimes the physician knew that he was assisting in a dishonest act, and did not care so long as he got paid; at other times physicians assisted unintentionally and unknowingly, not realizing what he was doing, or because he knew what he was doing and did not know how to do otherwise.

Need For Physicians in Industry

NATURALLY, employers recognized in time that they were being imposed upon and endeavored to prevent it, and some industries employed physicians to assist them in this as well as to assist them also in handling other medical problems that arose in connection with the operation of their business.

Safeguarding of Employees

THE present workmen's compensation act applies only to accidents arising out of and in the course of employment and to occupational disease. It does not apply to ordinary sickness. But the Telephone Company early recognized the relationship between poor health and accidents, and poor service, and that the best service was impossible unless the employees were healthy. So, with a view to reducing accidents and improving service, in 1912 this company adopted a plan, called the "benefit plan," for paying benefits to its employees absent from work on account of sickness and accident, thus fulfilling the law's requirements regarding accident and taking care of the employees when sick. The Telephone Company is self-insured, and calls its insurance payments "benefits" of "employee benefits."

Payment by the Company

EMPLOYEES are not legally entitled under the workmen's compensation act to benefits during sickness as they are in case of accident. These "sickness" benefits are paid voluntarily by the company and are under the direction of a committee known as the "benefit committee." The amount and the length of time during which these sickness benefits are paid depend upon the employee's wages and length of service. Money for both sickness and accident benefits comes from the earnings of the company and is charged to operating expenses, just as are other expenditures made in connection with the running of the business. The employees do not contribute directly or indirectly to these benefits, and in no way directly or indirectly do these expenditures influence the company's wage schedule. This is purely a part of the company's welfare or health work for the benefit of its employees and for improving service. It should have reduced accidents and time lost by employees on account of sickness and accident. It accomplished all of these things except to reduce the amount of time lost on account of sickness.

Increase in Time Lost

TIME lost by employees on account of sickness increased steadily and amazingly after the benefit plan was adopted. A few years after the adoption of the benefit plan, considerably more than twice as much time was being lost on account of sickness as at the time when the plan was adopted. Obviously, this was not due to the work or to bad health conditions in the community, for a majority of the employees never got sick; it was apparently due to the fact that some employees were taking advantage of the company by pretending to be sick when they were not, and by prolonging illness unduly.

Medical Department

THE Chesapeake and Potomac Telephone Company is a large concern. It operates in the District of Columbia, throughout Maryland, Virginia and West Virginia, and has more than 10,000 employees. The headquarters' offices of the company are in Washington. The Medical Department looks after the company's medical activities throughout the C. & P. territory. The headquarters and business office of the Medical Department are located in Washington, where is maintained also a medical office for the examination of applicants and employees and for first-aid treatment, and where in addition to the Medical Director, who is a physician employed on a part-time basis, and the lay force engaged in attending to the business of the office, there are employed regularly one part-time physician and two full-time nurses. The company also maintains a similar medical office in Baltimore, where are employed regularly one part-time physician and one full-time nurse. And in numerous other centrally located cities and towns in the C. & P. territory physicians have been selected and appointed to make examinations and to attend to other local medical matters for the company as the need therefor arises, all under the direction of the Medical Director.

Duties of the Medical Department

THE principal duties of the Medical Department are: (1) To examine all applicants for employment, so that the company may get reasonably healthy employees, (2) to examine employees who have been sick to see if they are able to return to their regular work or should be given some other kind of work for a time, (3) to examine employees who show a tendency to lose too much time on account of sickness to see if something can be done to improve the health of these employees, (4) to cooperate in an advisory capacity with the legal department in handling damage suits and compensation cases and with the other departments in handling any medical matters that arise in connection with the business of the company, and (5) to serve as the liaison office between the company and physicians attending the company's employees for the purpose of obtaining information concerning employees who are absent because of sickness or any reason connected with physical disability.

Absence of Dispensary or Clinic

THE company does not operate a dispensary or a clinic, or undertake to treat its employees who become sick or disabled, except to give first-aid treatment in Washington and in Baltimore when an employee is taken ill or is injured while at work, and occasionally to give simple treatments to an old employee with a chronic ailment who has no regular attending physician. The company prefers that employees shall have private physicians to take care of them and their families when sick or disabled.

Right to Select Personal Physicians

IN CASE of illness the company never questions the right of an employee to have any physician or mode of treatment desired, chiropractic, osteopathic, regular or ir-

regular, provided the employee and the physician are believed to be acting in good faith and the treatment is directed intelligently. But in case of accident on duty or of occupational disease, when the company is under legal obligation to pay all the bills and to restore the individual to health when possible, the company feels that it has the right to select the physician and the hospital, with due regard always for the feelings and wishes of the employee, and it would never interfere with a disabled employee having the advice and counsel of his regular physician. Usually the employees gladly avail themselves of the assistance offered by the company.

Non-Existence of Special Hazards

THERE are no special accident hazards or occupational diseases in telephone work, and there are few on-duty accidents, and very few of these are serious. The number of accidents has been materially reduced in recent years by instruction in accident prevention and in first aid. In case of serious accident the injured person is taken to the nearest approved hospital and the Medical Department is notified, and, if there is no particular physician the employee wishes to have called, the Medical Department sends someone to take charge of the case. When the injured employee selects his own surgeon and for any reason the company wishes to have a surgeon of its choice see the employee, the employee's surgeon is asked to call the company's surgeon in consultation so that they may meet at an appointed time and examine the patient together. Subsequent events will be determined by the report made to the company by the company's surgeon. It is the company's desire to cooperate with the employee's surgeon, not to interfere with him. When there is conflict of opinion, the Medical Director or the company's medical representative will discuss the matter frankly and freely with the employee's surgeon.

Sickness

WHEN sick and unable to be at work the employee is expected to notify his department, and to get competent medical attention, and as the company has to fill an absent employee's place it would like to know when the employee may be expected to return to work; also as it pays benefits during disability due to sickness the employee is required to furnish the company a certificate on a form filled in by the attending physician stating the reason for the absence and the time when the employee may be expected to return to work. It is the employee's obligation to get this report from his physician and see that it is sent to the company. When the employee continues ill, a similar certificate is required every two weeks, so that the company may be informed of the course of the illness and of complications or changes that affect the prognosis, and may be assured that the employee continues under the care of a physician. These certificates are sent to the Medical Department for review by the Medical Director or someone trained to handle them. The Medical Department then advises the employee's department regarding the outlook and probable date of return to work. The benefit department is also kept informed.

Cooperation of Attending Physicians

MEDICAL ethics and the law in some respects seem to presume that all doctors, whatever the school of medicine in which they were trained, are equally competent and reliable, but undoubedly some physicians are better informed than others and some are more careful and conscientious than others. Most physicians attending employees now do their best to cooperate with the company, and give the information asked for in the certificates, but some physicians give so little information that their certificates are practically worthless. The nature of the illness which is the reason for the absence may not be stated clearly, or the absence stated as being necessary for recovery is all out of proportion to the diagnosis, or the time when the employee may be expected to return to work is said to be unknown or undetermined or indefinite.

The Medical Department does not wish to interfere with a physician attending an employee, but when the certificates do not explain clearly the reason for the absence or do not contain the information asked for, the company feels that it is necessary to investigate and it proceeds to do so.

Method of Investigating Absence

FIRST, as a rule, the Medical Director or one of the physicians in the employ of the company attempts to obtain additional information from the attending physician by telephone, by letter or in person. Only company physicians are permitted to confer with the attending physician concerning the illness of an employee, and information obtained in this way is considered confidential, the attending physician never being quoted. When it is not possible to obtain the needed information from the attending physician, as is sometimes the case, or when for any good reason it is deemed necessary to investigate the health of an employee, the employee is asked to come to one of the company's medical offices or to go to some physician selected by the company, who takes a history and makes a careful examination. Company physicians are instructed to make every effort to be considerate of employees, and to say and do nothing to cause displeasure or that might be regarded as a criticism of the employee's private physician. Then, after investigation, if the company is satisfied that an employee who is absent from work and supposed to be sick, is not sick and might be at work, benefits are stopped and the employee is given leave without pay. The company never insists that an employee who has been reported sick shall return to work until the attending physician reports that it is safe for the employee to do so, but sickness benefits may be withheld by the benefit committee when there is a valid reason for it, and stopping the benefits under these circumstances and giving leave without pay usually has a salutary effect. The employee soon comes back to work, and never in many hundreds of cases have I seen any harm done. Should the employee not return to work and should it appear later that the employee really is sick, benefits will be restored and all unpaid benefits paid in full. The company wants its employees on the job but does not want them to come to work when they are sick or disabled.

The company has found that it cannot always rely upon the attending physician to see that an employee who has been sick returns to work as soon as he has recovered and is able to do so, but it may not be the attending physician's fault when a patient who has recovered from an illness or an injury does not return to work promptly. A physician may think that his patient has recovered, but he cannot well insist upon his patient returning to work when the patient says he is sick and unable to work. Under existing circumstances when the employer is paying disability benefits, it seems to me that physicians attending those who work for others have a duty and a responsibility to the employer as well as to the employee who is the patient.

Ethical Assistance

THE company does not expect or desire a physician attending an employee to aid the company unduly, or to do anything for the company he should not do. The company also does not like to believe that physicians intentionally mean to be parties to prolonging an illness unduly or that they keep their patients under treatment longer than is really necessary but sometimes this would appear to be the case, for it is certain that much more time is lost by employees on account of sickness than should be lost on this account, and it is also certain that employees can stay away on account of sickness only with the approval and assistance of the physicians who are attending them and who certify that they are sick, or disabled and that absence is necessary.

Statistics

BENEFITS during sickness are paid as a rule only to those employees who have had two or more years' of service, so that it is possible to compare groups not receiving benefits during sickness with groups receiving benefits, and it is found that a great deal more time is being lost by employees receiving sickness benefits than by employees not receiving these benefits. It is found also that much more time is lost on account of sickness by women than by men, for which there is no adequate explanation, and about two-thirds of the employees are women.

Taking statistics for the three years, 1926, 1927 and 1928, selecting these years at random as a fair example of conditions in recent years, it is found that men of less than two years' service and, therefore, not eligible to benefits, lost during these three years an average of 126.4 days per month per 1,000

The Association for the Advancement of Industrial Medicine and Surgery

Inc.

Executive Office - 370 Lexington Avenue, N. Y. (Room 904)

PURPOSE: *To disseminate accurate medical knowledge in reference to the diagnosis and treatment of all conditions arising out of and in the course of employment.*

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employees, while men of two to five years' service, eligible to benefits and comparable in age and experience, lost during this period 249.3 days per month per 1,000 employees, almost exactly double what male employees not eligible to benefits lost. Women of less than two years' service and not eligible to benefits, lost during this period an average of 353.5 days per month per 1,000 employees, while women of two to five years' service, eligible to benefits, at the same time lost an average of 824.1 days per month per 1,000 employees, more than double what female employees not eligible to benefits lost.

There are no statistics available showing what was the situation prior to adoption of the benefit plan, but in 1913, the first year after the adoption of the plan, 400 days per month per 1,000 employees were lost on account of sickness. Eight years later, when the plan was still going full swing without special supervision, 1,020 days per month per 1,000 employees were lost on account of sickness, more than two and one-half times as many as when the plan was first adopted. Since 1921, absence due to sickness has been more carefully supervised and unusual absences due to sickness have been reviewed by company physicians, and, in 1933, 12 years later, only 313 days were lost per month on account of sickness for every 1,000 employees eligible to benefits, a saving since 1921 of a little over 700 days per month per 1,000 employees eligible to benefits.[1]

This saving was made partly in a reduction in the number of days lost per illness, and partly in a reduction in the percentage of men and women eligible to benefits who were absent on account of sickness, for in 1921, 17% of the men and 30% of the women eligible to benefits were absent on account of sickness, while in 1933, only 10% of the men and 19% of the women eligible were absent on this account. And in 1921 the average time lost per case among employees eligible to benefits was 43 days, while in 1933 the average time lost per case was 28 days.

Necessity of Knowing Hazard

IT IS evident, therefore, that the company has been justified in supervising absences due to sickness, and in investigating the physical condition of its employees in order to determine the health outlook. It is necessary for the company to know also what is the accident hazard in its employees, for in case of accident the law makes no distinction between healthy and unhealthy employees, nor does it consider whether disability or death is due to the employee's own carelessness or to disease that existed prior to employment, or is the company's fault. The company is held entirely responsible regardless of contributing circumstances, just as it is held responsible when service is poor. Poor health predisposes to accidents and good service is impossible when the employees are not healthy. The company is compelled to see to it, therefore, that its employees measure up to certain standards of physical fitness, and it is the company's job to see to this. The company cannot and should not expect private physicians to do this.

The Right to a Wassermann

IT HAS been suggested that the company has no right to have a Wassermann test made on an employee who has a private physician without that physician's consent, or, if the employee has no private physician, without explaining the full meaning of the test to the employee. Obviously, various complications would arise if the meaning of the Wassermann test was explained to the employee before hand, and much time would be lost in trying to obtain the private physician's consent. The Medical Director has also encountered more than one physician attending an employee who, when the matter was being discussed, stated that he did not believe in the Wassermann test, or that the test was not necessary. Most physicians would cooperate, but the company itself has to make the test as a rule, if it is to know the result and to get it promptly. If the company's physician finds that the test is positive, it is checked at once by a second test, and if again found to be positive, the employee's doctor is then told the result and asked to check the test himself. The company physician does not tell the employee the result of the test; he tells the employee's physician and leaves it to him to tell the employee. When the employee has no physician and the test is positive, the employee is advised to get a physician, and he is helped to get one if necessary, and the physician is then told.

When the company makes a Wassermann test or examines one of its employees there is no desire to take advantage of the employee or anyone, and there is no dishonest purpose in making the test, but merely a desire to learn the truth. No harm is done the individual or the doctor, and the doctor is not being treated discourteously. On the contrary both the doctor and his patient will be benefited. If it is wrong for the company to make a Wassermann test on an employee, then the company has no right to make any sort of examination of its employees, and yet in every state in the Union, except one, if an employee dies as a result of syphilis or heart disease or any other disease contracted prior to employment, and it can be shown that the

1. The depression probably helped materially—the reason is self-evident.

2. West Publishing Co., St. Paul, Minn., February 12, 1934, p. 324.

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Surgical Director

Aetna Life Insurance Company

Doctor Gray's work brings him into daily contact with hundreds of physicians and surgeons. He is the focal point for a nation-wide medical experience—abreast of new developments in many specialties. The enormous amount of scientific data gathered from research in this wide experience is the basis for his useful new book, the *Attorneys' Textbook of Medicine*. It deals with the field of medicine in which compensation and liability claims most frequently arise; is of utmost practical value to Doctors and Lawyers; is so written that Lawyers may understand Doctors, while, at the same time it is of utmost *practical service* to Doctors in diagnosis and treatment. The text is supported throughout by recognized authorities whose works are cited. It presents medicine through the eyes of the Insurance Carrier, a most important viewpoint, both for the protection of the patient and the protection of society. It aids the Doctor to qualify in the service of insurance carriers on compensation and liability claims.

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Anthracosis
Asbestosis
Baker's Itch
Benzol Poisoning
Carbon Monoxide Poisoning
Carbon Tetrachloride Poisoning
Chromium Poisoning
Lead Poisoning
Manganese Poisoning
Mercury Poisoning
Methyl Bromide Poisoning
Silicosis
Sulphur Dioxide Poisoning

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Infection
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Heart Disease
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Compressed Air Disease
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disease has been aggravated in the least by his work, the company is held wholly responsible for the employee's death.

A judicial opinion, reported in the "Federal Supplement,"[2] has a definite bearing upon this question. It reads:

"The fact that employee was predisposed to injury by the long existing arterial aneurysm (due to syphilis) does not preclude a compensation award if his work had some definite, discernible, and proximate relation to the rupture (of the aneurysm) which caused his death."

There are other similar cases on record, some due to syphilis, some to circulatory or cardiac or other disease, and this sort of thing obliges the employee to determine the physical condition of his employees, including syphilis, or bear the consequence. Neglect to do so has proved extremely expensive to industry in many instances.

Unethical Reports

RETURNING to the question of ethics and the responsibility of the attending physician to his patient's employer, is it right for an attending physician to give "anemia and run-down condition" as the reason for advising six weeks' absence from work during which the patient's wages will be paid as sickness benefits, when as the company learns later the physician has not made a blood count, and examination by a company physician shows that the employee is not anemic but just tired, possibly from home work or social activities combined with business duties? Or should a physician give "low blood pressure," as the reason for advising indefinite absence during which the patient will be paid benefits, when the blood pressure is normal? Or give "acidosis" or "some obscure infectious condition" as the reason for indefinite absence during which the patient will be paid benefits, when the condition is pregnancy for which the patient is not entitled to benefits? Or give "inguinal adenitis and abscess due to injury while at work" as the reason for prolonged absence and a demand that the company pay for the treatment, when the trouble is due to syphilis and the man has a 4 plus Wassermann? Or to dianose "hernia due to strain while at work" when their is no hernia? Is it right that a person receiving sickness benefit should be allowed to take six to eight weeks to recover from an uncomplicated appendectomy, and three or four weeks to recover from common colds or simple indigestion? Shall the company allow an employee to be treated for neurasthenia when he has tuberculosis? Or be made to pay a large sum to a malingerer because some misguided doctor says the individual has traumatic neurosis? All these things have actually happened and similar cases are coming up constantly. This list could be drawn out interminably. There is hardly a day that passes when some such question does not come up in the Medical Department. And if these things are not right, then a considerable number of the physicians attending the company's employees are allowing their patients to do what is not right and assisting them in doing it. Most physicians wish to do what is right and it may not always be the physician's fault, but it seems at times that the physician is either very careless or very indifferent, and sometimes he appears to be also very ignorant. The world of industry has changed and conditions in industry are not what they were 20 years ago. Industry now has to protect itself from such practices, and physicians in industry maintain that they have the right to assist.

Company employees and physicians treating employees have been assisted many times by the company's Medical Department and company physicians, and never to my knowledge has an employee or a physician treating an employee suffered any inconvenience or loss thereby on the company's account without good reason for it. Of course, company physicians make mistakes at times, but the company tries to be fair and employees are always given the benefit of any doubt.

It is the sincere desire of the company that the methods employed in its Medical Department shall be in accord with the underlying principles of Medical Ethics.

New York Silicosis Bill Vetoed

GOV. LEHMAN, of New York, vetoed the bill which passed the New York legislature to amend the Workmen's Compensation Law by setting up specific provisions for dealing with silica diseases. In a memorandum accompanying his disapproval the Governor said: "This bill amends the Workmen's Compensation Law to provide special compensation for injuries resulting from the inhalation of harmful dust, particularly prevalent in certain industries. The provisions of this bill were sponsored principally by representatives of industry and insurance companies. Upon further consideration of the bill they now believe it contains inadvisable features. Many industrialists and insurance companies have urged that the bill be vetoed. Even though this bill did not become law, working men who suffer injuries from silicosis or other harmful dust diseases will, nevertheless, be protected and compensated under the Workmen's Compensation Act because of the bill recommended by means of the legislature this year, which will bring all occupational diseases within the scope of the Workmen's Compensation Law. The bill is disapproved."

Under the bill all workers who were employed for a specified length of time in industries having a silica dust hazard and who had any stage of silicosis, as disclosed by x-ray examination, would have been eligible for benefit the minute the Governor signed the bill. It would not have been necessary to show that disability because of silicosis had taken place. It was estimated by some that this provision would have exposed industry to charges as high as $10,000,000 for additional compensation

insurance premiums to cover payment for disabilities which employees undoubtedly had already contracted through working in dusty occupations.

"All Physicians Should File Applications Promptly"

EVERY physician is urged to file an application for authorization to practice under the Workmen's Compensation Law which becomes effective as of July 1st*. Application forms as recommended by the Medical Society of the State of New York for the use of County Medical Societies are available at the office of the Medical Society of the County of Kings, 1313 Bedford Avenue, Brooklyn, N. Y., and at various hospitals in the borough.

With each form a page of explanation prepared by the Committee on Workmen's Compensation of the Medical Society of the State of New York will be provided. Every physician filing an application is requested to read this page carefully. Appended to this page of explanation, physicians of Brooklyn will find a statement from the Medical Society of the County of Kings reading as follows:

"In view of the fact that the Medical Society of the County of Kings will be under great expense to carry out the mandatory provisions of chapter 258 of the Laws of 1935, a fee of $3 will be required with each application. Checks should be made payable to the Medical Society of the County of Kings."

The necessity for a filing fee, in view of the service that will be rendered to the profession, is recognized by all concerned. The recent amendment to the Workmen's Compensation Law carried no specific statement as to the method of financing but the mandatory provision placed the responsibility on the County Medical Societies. The Industrial Commissioner agrees that the County Medical Societies may charge a reasonable fee in connection with the application form and has so in-

*From *The Bulletin of the Medical Society of the County of Kings and Academy of Medicine of Brooklyn*, June, 1935. For the full text of the new law, see *Industrial Medicine*, May, 1935, p. 272.

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formed the Medical Society of the State of New York.

The Medical Society of the County of Kings has rented additional space in which to conduct its increased activities for the benefit of the entire profession. Not only does this involve space, but requires the employment of at least three extra persons; considerable incidental expense for postage, stationery, equipment and the like, informational service to the profession from time to time, and the presentation, at a later date, to physicians authorized to treat workmen under the law, of a booklet of instructions to be prepared jointly, as we are informed, by the Committee on Workmen's Compensation of the State Society and the Industrial Commissioner.

To administer its responsibilities under the Law, the Medical Society of the County of Kings, by action of the Comitta Minora at its meeting on May 8th, established a Board of Five with power to execute the responsibilities and duties placed upon the Medical Society by the Law which takes effect July 1st.

The Committee on Workmen's Compensation of the Medical Society of the State of New York, which was authorized at the meeting of the House of Delegates on May 12, 1935, has been working assiduously, has held conferences with the County Medical Societies, State Society committees, the Compensation Boards of the metropolitan area, and the Industrial Commissioner, with the object in view of having the medical profession prepared in as complete a manner as possible to conduct its affairs in an orderly manner in compliance with the Law, which becomes effective on July 1st.

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DeVILBISS COMPANY, in order to facilitate prompt and effective treatment of burns, has developed a special atomizer for applying tannic acid. This atomizer offers particular speed and convenience in first-aid work by the incorporation of three special features: (1) a wide-mouthed bottle to facilitate filling, stirring, and cleaning; (2) acid and water levels clearly marked on the bottle to make correct mixing easy; and (3) a wide volume of soft spray, giving quick and effective application over a wide area. Complete information on the new No. 260 Tannic Acid Atmoizer may be secured from the DeVilbiss Company, Toledo, Ohio.

*Original Publication in *Industrial Medicine*.